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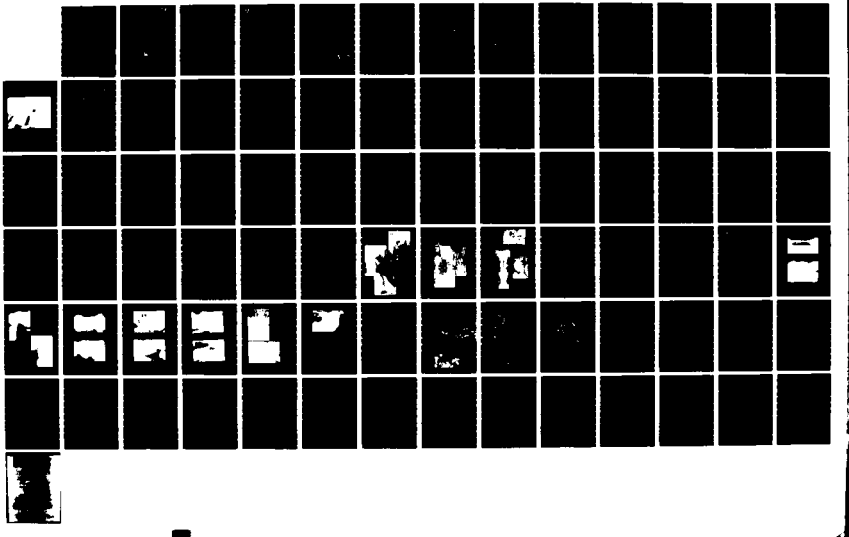

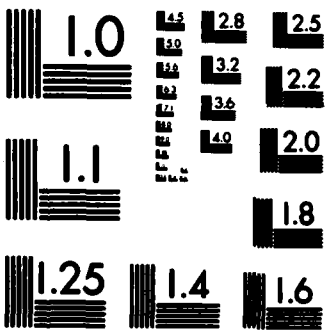

CONNECTICUT RIVER BASIN
SOMERS , CONNECTICUT

SOMERSVILLE POND DAM
CT. 00273

PHASE 1 INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

AUGUST, 1980

UNCLASSIFIED
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam at Somersville Pond is a masonry structure with earth abutments that has an overall length of 185 feet, of which 96 ft. is the overflow stone masonry concrete capped spillway, and a height of 21.5 feet. As a result of the visual inspection at the site, the dam is considered to be in POOR condition. The dam is classified as SMALL in size and a SIGNIFICANT hazard structure.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

OCT 17 1980

Honorable Ella T. Grasso
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor Grasso:

Inclosed is a copy of the Somersville Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the cooperating agency for the State of Connecticut. In addition, a copy of the report has also been furnished the owner, State of Connecticut, Dept. of Environmental Protection, North Windham, CT.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

Sincerely,

MAX B. SCHEIDER
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

SOMERSVILLE POND DAM

CT 00273

THAMES RIVER BASIN

SOMERSVILLE, CONNECTICUT

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

IDENTIFICATION NUMBER:	CT 00273
NAME OF DAM:	Somersville Pond Dam
TOWN:	Somersville
COUNTY AND STATE:	Tolland County, Connecticut
STREAM:	Scantic River
DATE OF INSPECTION:	8 April 1980

Brief Assessment

The dam at Somersville Pond is a masonry structure with earth abutments that has an overall length of 185 feet, of which 96 feet is the overflow stone masonry concrete capped spillway, and a height of 21.5 feet. The dam appears to be founded on ledge. The dam is presently used for recreation and limited hydro-electric power. The dam has two outlet works gates, one of which is located at the left spillway abutment and the other is located at the right spillway abutment, both of which could not be measured because of the water level at the time of the inspection. Discharges from the right outlet works flow through a covered reinforced concrete culvert to a penstock and turbine. The left outlet works gates appear nonfunctional and abandoned. All outlet works discharges flow back into the Scantic River.

As a result of the visual inspection at the site, the dam is considered to be in POOR condition. Deficiencies observed include: the inoperable outlet works gate; trees and brush located on embankments and spillway abutments; dislodged stone work at the right outlet works gate; spalled and cracked spillway abutments; and seepage at the right spillway abutment.

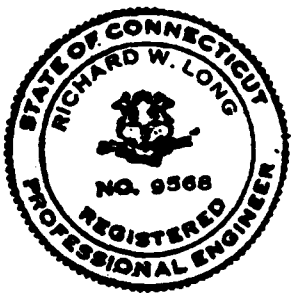
The dam is classified as SMALL in size and a SIGNIFICANT hazard structure in accordance with the recommended guidelines established by the Corps of Engineers. The adopted "test flood" inflow for Somersville is one-half the Probable Maximum Flood (PMF) which is estimated to be 11,400 CFS from the 57.0 square mile drainage basin. This test flood has an outflow discharge equal to 11,200 CFS and would overtop the dam by about 4.77 feet; therefore, the existing spillway capacity is considered to be inadequate and cannot meet the spillway design flood screening criteria. The maximum spillway discharge of 2,750 CFS represents only 25 percent of the test flood outflow. Overtopping could result in failure of this earth embankment.

It is recommended that the Owner engage the services of a registered engineer experienced in design of dams to accomplish the following: perform more detailed hydrologic studies to evaluate the impact of the test flood on the facilities and to improve the capacity of of the dam to pass the flood flows, reducing the overtopping potential; remove trees and brush from the embankments and spillway abutments; repair all spalled concrete on the abutments, outlet works structures and discharge culvert; and rehabilitate the left outlet works gate and conduit to an operational status.

Additional recommendations and remedial measures are detailed in Section 7 and should be implemented by the Owner within one year after receipt of this Phase I Inspection Report.

CE MAGUIRE, INC.

By Richard W. Long
Richard W. Long, P.E.
Vice President



This Phase I Inspection Report on, Somersville Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

Carney M. Terzian

CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

Richard J. DiBuono

RICHARD DIBUONO, MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:

Joe B. Fryar

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain condition which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

The Phase I Investigation does <u>not</u> include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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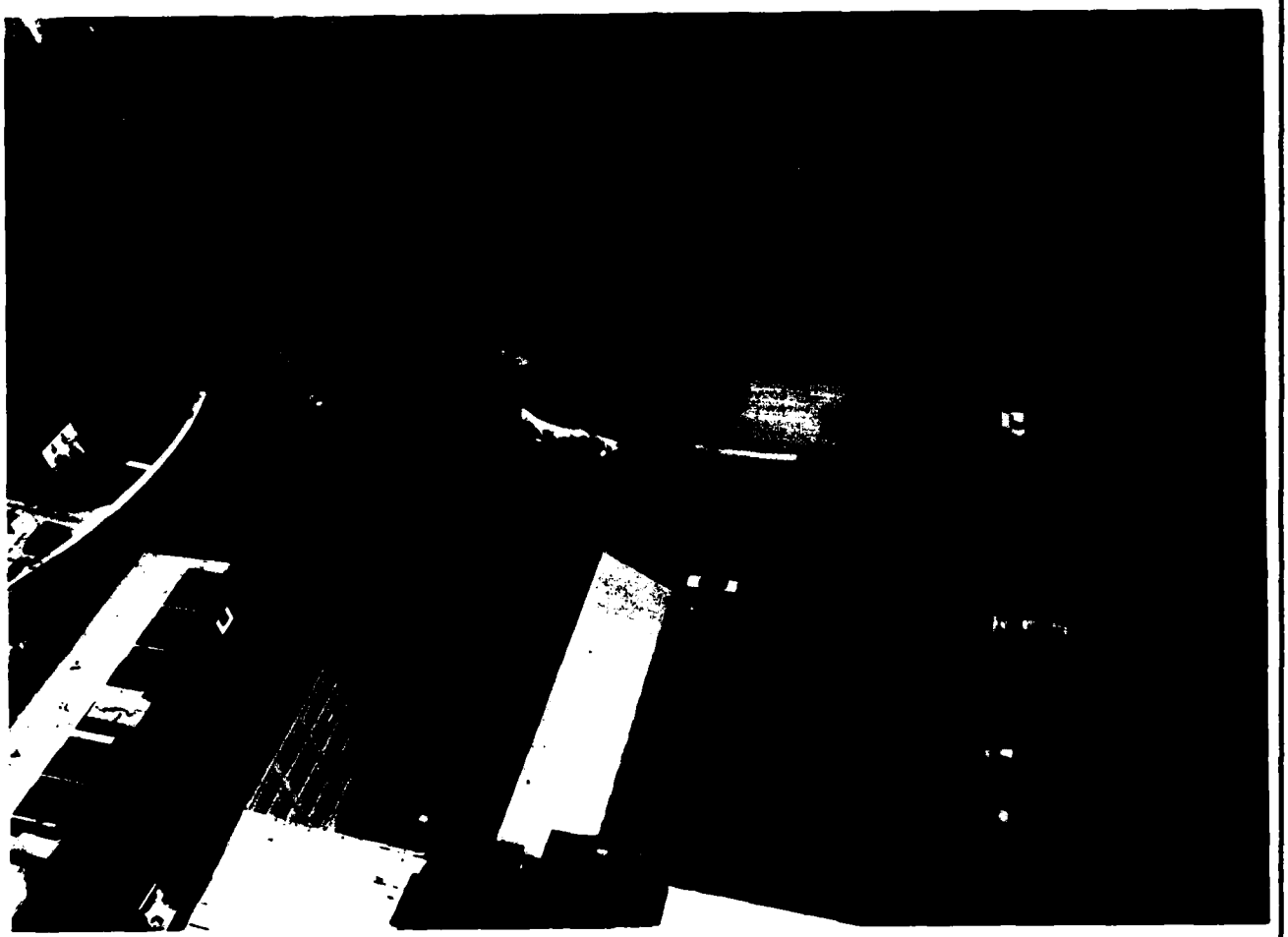
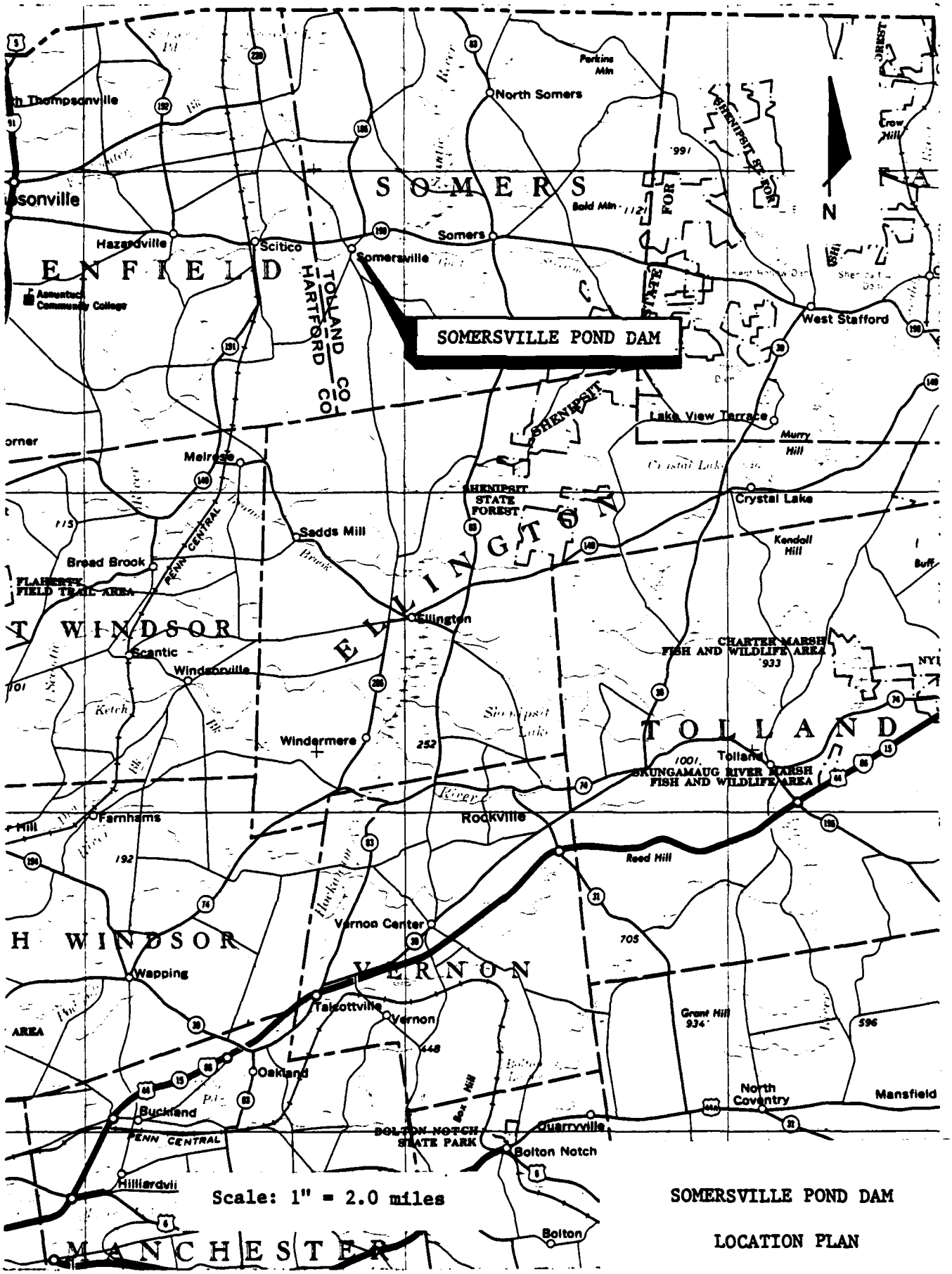
APPENDICES



OVERVIEW PHOTO - Somersville Pond Dam



Scale: 1" = 2.0 miles

SOMERSVILLE POND DAM

LOCATION PLAN

PLATE NO. 1

NATIONAL DAM INSPECTION PROGRAM

PHASE I - INSPECTION REPORT

NAME OF DAM: SOMERSVILLE POND DAM

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. CE Maguire, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to CE Maguire, Inc., under a letter from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-80-C-0013 has been assigned by the Corps of Engineers for this work.

b. Purpose of Inspection.

1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

2. Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.

3. To update, verify and complete the National Inventory of Dams.

1.2 Description of the Project

a. Location. Somersville Pond Dam is located in the Town of Somersville, Connecticut. Coordinates of the dam are about 41° 58.0'N Latitude and 72°26.7'W Longitude. See Plate No. 1. The dam is located 600 feet north of the intersection of Maple Street, Scitico and Pinney Roads. The dam impounds water from the Scantic River and drains a watershed of 57 square miles.

b. Description of the Dam and Appurtenances. The dam at Somersville Pond is approximately 185 feet in length (including the 96-foot long overflow spillway) with an average height of 21.5

feet, and is a stone masonry structure with earth abutments. The overflow spillway appears to be a stone masonry and concrete uncontrolled weir located at the left abutment of the dam (see Plan in Appendix B). There are two outlet works structures, one located at the left dam abutment and the other at the right spillway abutment. The intake gates were not measured during the field inspection because of the high flow conditions. Their size is unknown and not documented. Discharges from the left outlet structure flow under an adjacent mill building and discharge into the south side of the Scantic River approximately 65 feet downstream from the toe of the dam. This outlet, at the present, is unused and blocked. Discharges from the right outlet structure flow through a covered reinforced concrete conduit approximately 285 feet in length to a mill complex located 130 feet downstream from the dam, and thence into a steel penstock approximately 6 feet in diameter which supplies a hydro-electric turbine. This flow discharges into the north side of the Scantic River approximately 175 feet downstream of the toe of the dam. Discharges from the spillway flow directly into the Scantic River.

c. Size Classification. Somersville Pond Dam has an impoundment capacity at the top of the dam (Elev. 184.50 feet NGVD) equal to 553 Ac-Ft. and a height of 21.50 feet. In accordance with guideline criteria established by the Corps of Engineers, this dam is classified as SMALL in size based on both size and the impoundment capacity.

d. Hazard Classification. The dam is classified as a SIGNIFICANT hazard potential structure because its failure could result in the loss of a few lives and inundation of 3-4 dwellings, 1-2 industrial structures, and 1-2 roads (Scitico Road and Rt. 191). Utility services within the rights of way may temporarily be disrupted. It is estimated that the failure discharge will be 7250 CFS. See Appendix D for additional data.

e. Ownership. Somersville Pond Dam is owned by the State of Connecticut and managed by the Department of Environmental Protection, Division of Conservation and Preservation, Region 3 - District. Water rights and both sluiceways are owned by Corbin Gentry Inc., 40 Maple Street, Somersville, Connecticut 06072; 203/243-7264.

f. Operator

1. Dam: John Smutnick
Unit Manager Region 3
Department of Environmental Protection
Mansfield Hollow State Park
Old Route 6
North Windham, Connecticut 06256

2. Gates: Gorbin-Gentry Inc.
40 Maple Street
Somersville, Connecticut 06072

g. Purpose of the Dam. General recreation and hydro-electric power.

h. Design and Construction History. Somersville Pond Dam was reportedly built around 1890. No design or construction drawings or general information were available for the dam. A plan which delineates adjacent mill buildings, the dam, and the configuration of the right intake structure and sluiceway was made available by a local surveyor and is included in Appendix B.

i. Normal Operating Procedures. A limited amount of water is drawn through the right outlet works structure which provides power for the hydro-electric generating facility located in the adjacent mill building. Normally water levels are determined by the uncontrolled overflow spillway.

1.3 Pertinent Data

a. Drainage Area. Somersville Pond drainage basin, located in the Town of Somersville, Windham County, Connecticut, is oval in shape with an average length of 10 miles and an average width of 7.0 square miles and a total drainage area of 57 square miles (See Appendix D for Basin Map) Approximately 10% of the watershed (5.7 square miles) is swampy or natural storage. The topography is generally flat to moderate with elevations ranging from a high of 1,200 feet near the Tolland and Hampden County Boundary Line to 180 feet at Somersville Pond Dam.

The time of concentration for the watershed is estimated to be about 5 hours and is relatively large, resulting in the probability that not all the surface runoff will peak simultaneously at the reservoir site during a high intensity rainfall event. In addition, the large amount of storage area within the watershed tends to dampen and attenuate the peak volume.

b. Discharge at Damsite

(1.) Outlet Works:	Sizes of outlet works @ both the left and right abutments of the dam are unknown and could not be determined at the time of the visual inspection.
(2) Maximum known flood at damsite	Unknown

(3)	Ungated spillway capacity @ top of dam	2,750 CFS @ elev. 184.5 feet
(4)	Ungated spillway capacity at test flood elevation	N/A (Test Flood overtops dam)
(5)	Gated spillway capacity at normal pool elevation	N/A
(6)	Gated spillway capacity at test flood elevation	N/A
(7)	Total spillway capacity at test flood elevation	N/A
(8)	Total project discharge at top of dam	3,165 CFS @ elev. 184.5 feet
(9)	Total project discharge at test flood elevation	11,510 CFS @ elev. 189.27 feet

(c) Elevations (feet above NGVD)

(1)	Streambed at toe of dam	163
(2)	Bottom of cutoff	Unknown
(3)	Maximum tailwater	Unknown
(4)	Recreation pool	180
(5)	Full flood control pool	N/A
(6)	Spillway crest	180
(7)	Design surcharge (Original Design)	Unknown
(8)	Top of dam	184.5
(9)	Test flood design surcharge	Unknown

(d) Reservoir (length in feet)

(1)	Normal pool	4500
(2)	Flood control pool	N/A
(3)	Spillway crest pool	4500
(4)	Top of dam	4500

(5)	Test flood pool	4500
(e)	Storage (acre-feet)	
(1)	Normal pool	350
(2)	Flood control pool	N/A
(3)	Spillway crest pool	350
(4)	Top of dam	553
(5)	Test flood pool	755
(f)	Reservoir Surface (acres)	
(1)	Normal pool	45
(2)	Flood control pool	N/A
(3)	Spillway crest	45
(4)	Test flood pool	45
(5)	Top of dam	45
(g)	Dam	Dike N/A
(1)	Type	earth embankment
(2)	Length	185 feet
(3)	Height	21.5
(4)	Top Width	Variable
(5)	Side Slopes	Variable
(6)	Zoning	Unknown
(7)	Impervious Core	Unknown
(8)	Cutoff	Unknown
(9)	Grout curtain	Unknown
(10)	Other	Unknown
(h)	Diversion and Regulating Tunnel	N/A

(i) Spillway

(1)	Type	Stone masonry-concrete cap, uncontrolled, overflow weir
(2)	Length of weir	96 feet
(3)	Crest elevation	180
(4)	Gates	N/A
(5)	U/S Channel	Unobservable natural river bed
(6)	D/S Channel	Straight, bedrock outcrop
(7)	General	Double archway highway bridge and mill complex 75 feet downstream of dam

(j) Regulating Outlets

Refer to Paragraph 1.2b "Description of Dam and Appurtenances", Page 1-1 for description of outlet works.

		Left of Spillway	Right of Spillway
(1)	Invert	163.14	Unknown
(2)	Size	(Blocked)	Unknown
(3)	Description	double gated sluiceway	double gated sluiceway
(4)	Control Mechanism	manually assisted double gated wooden sluice gate	Manually assisted double gated wooden sluice gate
(5)	Other	Low level gates left of the spillway appear to be inoperable No flow was observed flowing in or out of system left of the spillway.	Low level gates (2) right of the spillway connected to a 6 ft. diameter steel penstock via a 7'H x 12'W reinforced concrete box conduit to a hydro-generator facility.

SECTION 2

ENGINEERING DATA

2.1 Design. No design data is available for this dam.

2.2 Construction Data. No record of original construction is available for this dam. A general location plan prepared by Reino E. Hyypa & Associates for the licensing of the hydro-electric facility has been included in Appendix B-3. No other documentation is available.

2.3 Operation Data. No records are maintained of gate operation.

2.4 Evaluation of Data.

a. Availability. There are no plans, specifications or computations available from the Owner regarding the design of this dam. Limited correspondence was available from the Owner (State of Connecticut, Department of Environmental Protection).

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection, past performance, and sound engineering judgement.

c. Validity. The validity of the limited data must be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings

a. General. The phase 1 visual inspection of Somersville Pond Dam was conducted on April 8, 1980 by representatives of C.E. Maguire, Inc. and Geotechnical Engineers, Inc. An inspection checklist and photographic record of that inspection have been included in Appendix A and C, respectively of this report.

Based on the visual inspection, history, and general appearance, the Somersville Pond Dam and its appurtenances are judged to be in POOR condition. Both the left and right spillway abutments are badly deteriorated with some seepage at the right abutment (see Photos C-7, C-8, and C-12). Trees and brush are growing on the upstream slope of the dam embankment and the spillway abutments. The outlet works gates at the left spillway abutment appear to be in poor condition and non operational. Large trees are growing on the upstream embankment right of the spillway and on the left spillway training wall abutment.

b. Dam. The dam consists of a 96 ft. long stone masonry concrete capped spillway and 89 ft. long earth embankment to the right of the spillway.

1. Upstream Slope. The upstream slope of the embankment is grass and tree covered (see Photos C-2 and C-11). A 10 ft. section of cut granite block wall extends from the right outlet works structure toward the right dam abutment. Several blocks of the wall have been dislodged and rolled into the pond (see Photo C-10).

The upstream slope is very irregular. There is no embankment protection in this area to prevent erosion or scouring if such an event were to take place.

2. Crest and Downstream Slope. The crest and downstream slope have been exposed to extensive trespassing and exhibit an irregular surface. The crest and downstream slope grade gradually to natural ground elevation downstream from the embankment. The upstream edge of the crest is grass covered but most of the crest and downstream slope consist of a sand and gravel surface parking area.

c. Appurtenant Structures. The appurtenant structures for this dam are the overflow spillway, the left and right gate structures, control gates, and sluiceways.

1. Spillway and Training Walls. The spillway is 96 feet in length and appears to be constructed of stone masonry with a concrete cap weir and masonry abutments. Approximately 0.75 feet of water was discharging over the uncontrolled spillway during the field investigation of Somersville Pond Dam and prevented a detailed inspection of the weir and downstream face of the spillway.

The approach channel consists of the natural Scantic River streambed which was submerged and could not be inspected but appeared to have occasional gravel and stones on its surface. The spillway crest and weir appeared to be in good condition.

The reinforced concrete left training wall of the spillway showed superficial spalling near the high water level upstream from the spillway crest. A large open vertical crack approximately 1" wide extends from the top of the wall to below the water level approximately 12 feet upstream from the spillway crest. The training wall upstream from the spillway crest has moved from 2 to 4 inches into the upstream channel. A 12-in. diameter tree is growing directly behind the left training wall adjacent to the spillway crest (see Photo C-3). The left training wall downstream of the spillway is founded at least partly on bedrock. The wall exhibits spalling and cracking (see Photo C-7).

The reinforced concrete right training wall is founded on bedrock. An overflow channel for the sluiceway buried behind the right training wall emerges at the top of the training wall near the spillway crest.

The right training wall downstream from the spillway crest is in poor condition. Spalling and erosion of the concrete extends as much as 12 inches into the wall and steel reinforcement is exposed at several locations (see Photos C-4, C-8 and C-13). At the time of inspection, seepage was observed to emerge from several locations in the wall (see Photo C-12). Approximately 1.5 ft. below the sluiceway overflow channel, seepage was observed to emerge from a severely eroded portion of the wall approximately 6 feet in width. Seepage was emerging through a 1/2-inch diameter drainpipe extending from the wall near the eroded section. A second drainpipe located 14 in. above the base of the wall was plugged, and some seepage was observed to emerge from a deeply eroded portion of the wall below the pipe. Near the downstream end of the wall at the base of an overturned tree, seepage was observed to flow at an estimated rate of 5 to 10 gallons per minute from a 3-ft. wide area at the base of the wall.

There were openings reaching at least 18 inches into the base of the wall. The origin of the seepage could not be determined during the visual inspection, but most likely seepage originates from the sluiceway channel described under the next heading.

2. Right Outlet Works. The concrete face of the intake structure showed minor spalling. The gates of the sluiceway were not operated during the inspection of the dam but are reportedly operational and appeared to be well maintained.

   The sluiceway extends through a covered reinforced concrete conduit to a mill building downstream of the dam. There were numerous cracks or open joints in the concrete canal with indications of past upwards flow due to pressure in the conduit. The sluiceway was inaccessible and could not be inspected. A survey plan supplied by the owner (see Appendix B) indicates the size (by scale from the plan) of the conduit to be about 7 feet high x 12 feet wide. There was no flow in the conduit at the time of inspection because of repairs being made to the hydroelectric turbine located at the end of the sluiceway and penstock. Reportedly flows which normally pass through the turbine can be rerouted around the turbine if needed. The outlet control was not operated during the visual inspection and it is unknown if it is operable.

   The outlet works sluiceway at the right spillway abutment includes a reinforced concrete overflow which appears to be for equalizing some of the internal pressures of the covered sluiceway (see Photos C-4 and C-8). The overflow channel, constructed of reinforced concrete, extends from the sluiceway to the spillway discharge channel adjacent to the spillway weir. The concrete structure is eroded and steel reinforcement is exposed over the right training wall of the spillway. The left channel wall of the sluiceway overflow is cracked and two small bushes were observed to grow from the wall. Soil behind the right channel wall has eroded into a dish-like depression. During the inspection, leaves and dead grass in the depression were removed to expose an erosion channel extending beneath the concrete wall.

3. Left Outlet Works. The left outlet works consists of a gated sluiceway located on the left dam abutment which discharges under an adjacent mill building approximately 65 feet downstream of the toe of the dam. The sluiceway was not inspected during the inspection of the dam because of lack of accessibility to the building. The wooden gates of the intake structure were badly deteriorated and ap-

peared to be nonfunctional. No flow was observed flowing from the downstream outlet channel during the inspection. The stone masonry left training wall is tilted and a small diameter tree is growing through the top of the wall.

d. Reservoir Area. Some minor erosion of the reservoir banks was observed along the northeast shore probably due to trespass and overuse. The slopes of the shoreline are flat and generally well covered with grass and vegetation to preclude sloughing and shoreline materials. The north shoreline area is used as a recreation area.

e. Downstream Channel. The downstream spillway channel is the natural streambed of the Scantic River. The floor of the channel consists of interbedded sandstone and conglomerate, dipping upstream at an angle of less than 15° and striking approximately parallel with the weir (see Photo C-8). The discharge channel continues from the spillway through a double arch highway bridge approximately 22 feet wide x 14 feet high and under the mill buildings downstream of the dam. (see Photo C-9).

3.2 Evaluation

Based on a visual inspection, the dam appears to be in poor condition. The following features could adversely affect the future performance of the dam:

1. Continued spalling and cracking of the spillway right training concrete wall by seepage and erosion could jeopardize the stability of the spillway right abutment. Collapse of the wall could lead to breaching of the embankment near the spillway. If the source of seepage is the reservoir, continued seepage could permit headward advance of the observed seepage channels to the upstream slope of the embankment and encourage progressively worsening seepage and erosion.

2. Trees on the upstream slope of the earth dam could be uprooted during storms, leaving depressions that may encourage further slope erosion. Continued growth of tree roots could provide seepage paths into the embankment.

3. The "emergency spillway" in the right abutment has no defined channel for the potential overflow; thus it is possible that deleterious erosion could occur downstream from the dam during overtopping.

4. Lack of slope protection on the upstream slope of the embankment left of the spillway could lead to continued erosion of the upstream slope and crest.

5. The poor condition of the sluice gates left of the spillway makes it doubtful that they could be operated during emergency conditions.

6. Continued growth of trees and brush adjacent to and from training walls of the spillway and intake structures could increase cracking and displacement of the walls.

7. The unknown size of the gates and outlets needs to be determined and their conditions evaluated.

SECTION 4

OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 Operational Procedures

a. General The storage at Somersville Pond is used for recreation and a limited amount of hydro-electric power. Presently the hydro-electric turbine is inoperable and awaiting repairs.

b. Description of Any Warning System in Effect. There is no warning system in effect for this dam.

4.2 Maintenance Procedures

a. General There is no program of maintenance for this dam at present. The divided ownership of this facility could further confuse maintenance responsibilities.

b. Operating Facilities Operating facilities have had limited or no maintenance performed on them. The gates located to the left of the spillway do not appear operational and the gates to the right of the spillway have had limited maintenance. The spillway abutments at both sides of the facility are in need of repairs.

4.3 Evaluation There is no regularly scheduled maintenance for this dam. There are numerous deficiencies which require attention:

a. Numerous trees and brush growing on and around the upstream and downstream embankments, spillway abutments and outlet gates.

b. Spalled and cracked spillway abutments.

c. Seepage at the spillway abutments.

d. Non operational or functional gate mechanisms.

e. Limited amounts of erosion along reservoir bank due to trespass.

f. Lack of an emergency action plan to prevent or minimize the impact in event of failure. Such a plan should list the expedient actions to be taken and authorities to be notified.

g. Lack of a scheduled program to monitor conditions at the dam as a regular basis during extreme weather conditions which could threaten the dam or downstream areas.

h. Lack of a scheduled maintenance program for the dam and its appurtenances.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General. Somersville Pond Dam, constructed around 1890, is located on the Scantic River in the Town of Somersville, Connecticut approximately 2 miles upstream from Route 191. The watershed for the pond is about 57 square miles, with approximately 10 percent of this basin natural storage.

The dam has a spillway length of 96 feet and a surcharge height of 4.5 feet between the spillway crest and the top of the dam. The total length of the dam is 185 feet. The reservoir has a storage capacity at the spillway crest level of 350 Ac-Ft and can accommodate 0.12 inches of runoff from the watershed. Each foot of depth in the reservoir above the spillway level can accommodate 45 Ac-Ft of water equivalent to 0.15 inches of runoff.

The dam has 405 Ac-Ft of surcharge storage available and a maximum spillway capacity equal to 2,750 CFS, which is 25 percent of the test flood outflow.

5.2 Design Date. Limited data is available for this watershed. In lieu of existing design information U.S.G.S. topographic maps (scale 1" = 2,000 ft.) were utilized to develop hydrologic parameters such as drainage area, reservoir surface area, basin slope, time of concentration and other runoff characteristics. Elevation/storage relationships were estimated. Surcharge storage was calculated assuming the surface area of the pool remained constant above the spillway crest. Some of the pertinent hydraulic data was obtained and/or verified by actual field measurements. Test flood inflow/outflow values and dam failure profiles were determined in accordance with the Corps of Enginners guidelines. Final values used in this report are quite approximate and are no substitute for actual detail analysis.

5.3 Experience Data. No historical data for recorded discharges or water surface elevations is available for this dam.

5.4 Test Flood Analysis. Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for the selection of the Test Flood. Under those guidelines, the dam is classified as a SIGNIFICANT hazard and SMALL size structure and warrants testing by a storm event ranging from the 100 year frequency event to the one-half Probable Maximum Flood (PMF). The watershed has a total drainage area equal to 57 sq. miles of which 10 percent or 5.7 sq. miles is swampy or natural storages. This drainage area is sparsely populated and largely wooded with flat to rolling terrain. The average basin slope is approximately .004 feet per foot which can be called flat. The overall hydrologic parameters of the basin indicate that the watershed should be classified as flat. A test flood equal to the one-half PMF is equal to 200 CSM or 11,400 CFS and was

adopted for this analysis because of the potential downstream damages that could occur. Outflow discharges were also developed using Corps of Engineers criteria for approximate routing. The outflow discharge for the test flood is 11,200 CFS. The spillway and outlet rating curves are illustrated in Appendix D. Flood routings were performed with an assumed full pond condition (at spillway crest level).

The spillway capacity is hydraulically inadequate to pass the test flood outflow and the test flood would overtop the dam by approximately 4.77 feet. The maximum outflow capacity of the spillway, in a still reservoir condition is 2,750 CFS or 25% of the test flood outflow discharge. At the spillway crest elevation, the capacity of the outlet structure is estimated to be 280 CFS. Using the outlet works, it will require 2 hours to lower the pool one foot. For the total storage to be drained through the outlet it will require approximately 30 hours. Because one foot of depth in the reservoir at the spillway crest is equal to 0.03 inches of runoff, it is estimated that overtopping of the dam by the test flood cannot be eliminated by lowering the pool level prior to storm inflow.

5.5. Dam Failure Analysis. An instantaneous full depth - partial width breach of 34 feet was assumed to have occurred in the dam. This would result in an unsteady flow condition, causing a failure wave to travel downstream and its reflection wave travelling into the reservoir and rebounding to reinforce the downstream wave passing through the valley. The calculated dam failure discharge of 7250 CFS presumes the reservoir level was at the top of the dam before failure and will result in water surface elevations of 172.8 feet immediately below the dam (about 3.3 feet above the depth just prior to failure). The estimated damage reach extends downstream 10,000 feet where normal uniform flow would occur. The failure could result in loss of a few lives and inundation of 3-4 dwellings and 1-2 industrial facilities. Water depths at the dwellings and industrial facilities from the failure discharge could range from 1-3 feet.

Flooding and potential damage may also occur to Scitico Road and Rt. 191 and cause temporary disruption to utility services located within the rights of way of those roadways. It is estimated that the water depths would average 9.8 feet and that velocities of flow could cause erosion, stripping of vegetation and additional damage from debris impact. The prime impact area has been estimated, if the dam were to fail, and has been delineated on the drainage basin map in Appendix D. As a result of the failure analysis, the dam has been classified as a SIGNIFICANT hazard structure.

SOMMERSVILLE POND DAM

Inflow, Outflow and Surcharge Data

FREQUENCY IN YEARS	24-HOUR TOTAL RAINFALL IN INCHES	24-HOUR* EFFECTIVE RAINFALL IN INCHES	MAXIMUM INFLOW IN CFS	MAXIMUM** OUTFLOW IN CFS	SURCHARGE HEIGHT IN FEET	SURCHARGE STORAGE ELEVATION
100	7.0	4.5	3990	3600	5.20	185.20
½ PMF	11.9	9.5	11400	11200	9.27	189.27

= Test Flood

*Infiltration assumed as 0.1"/hour
**Lake assumed initially full at spillway crest elevation 180.0 (top of dam = 184.50)

NOTES:

1. Q_{100}; inflow discharges were computed by the approximate methodology of the Soil Conservation Service.
2. ½PMF and "test flood" computation based on COE instructions and guidelines.
3. Maximum capacity of spillway without overtopping the top of the dam elevation (184.50) is equal to 2750 CFS.
4. All discharges indicated are dependent upon the continued integrity of upstream storage reservoirs.
5. Surcharge storage is allowed to overtop the dam when exceeding the spillway capacity.
6. Test flood = half PMF = 200 CSM = 11400 CFS (D.A. = 57.0 sq. miles).

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual observations did not disclose evidence of present structural instability of the dam. Conditions observed that may lead to future instability of the dam, include:

1) Continued spalling and cracking of the spillway right training wall by seepage and erosion.

2) Growth of trees on the upstream slope of the embankment that by uprooting during storms or continued root development may provide seepage paths into the embankment.

3) Continued erosion on the upstream may provide seepage paths into the embankment.

4) Growth of trees and bruch adjacent to an intake structure which could increase cracking and displacement of the walls.

Evidence of present structural instability was observed at the tilted left training wall on the left intake structure and the locally collapsed right training wall on the right intake structure. Evidence was also observed at the left upstream training wall of the spillway in the vicinity of the vertical crack noted in section 3.1C.

6.2 Design and Construction Data

No design or construction drawings or records for the embankment or spillway are available.

6.3 Post-Construction Changes

An inspection conducted in 1978 recommended to: a) "repair leaks in concrete sluice on northerly side," b) "repair southerly abutment at building to prevent undermining of building," and c) "make all sluice gates operational for emergency purposes." There is no record or indication that these recommended repairs were made.

In an inspection report dated June 28, 1978, it is mentioned that concrete had been placed "upstream of the dam to seal leaks through the stone face of the dam." These repairs could not be observed.

6.4 Seismic Stability

The dam is located in Seismic Zone I, and in accordance with recommended Phase I guidelines does not warrant seismic stability analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS & REMEDIAL MEASURES

7.1 Assessment

a. Condition

Based on the visual inspection, the dam appears to be in POOR condition. There are several features that could adversely affect the condition of the dam in the future:

1. Continued deterioration of and seepage through the spillway right training wall.

2. Trees on the upstream slope of the embankment, adjacent to the spillway training walls and in stone training walls of the intake structures.

3. The presence of an emergency spillway at the right abutment of the dam without slope protection or a defined discharge channel.

4. Lack of riprap protection on the upstream slope of the embankment.

5. Badly deteriorated gates at the left intake structure.

b. Adequacy of Information

The available information is such that the assessment of the condition of the dam must be based on visual observations.

c. Urgency

The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of the Phase I report.

7.2 Recommendations

The following items should be done under the direction of a qualified registered engineer:

1. Determine the source of seepage through the right training wall of the spillway and take appropriate measures to seal or control this seepage.

2. Repair the concrete on the spillway right training wall and provide adequate drainage through the wall.

3. Repair concrete on the right sluiceway overflow channel.

4. Repair gates on the left sluiceway intake structure.

5. Place riprap on the upstream slope of the embankment.

6. Remove trees growing on the embankment upstream slope and backfill root depressions with appropriate compacted soil.

7. Remove all trees and brush growing in or near training walls and appurtenant structures of the dam.

8. Inspect the downstream face of the spillway when there is no flow over the spillway.

9. Perform detailed hydrologic and hydraulic studies to further assess the need for and means to increase the project discharge capacity.

10. Monitoring of seepage; surveillance during high intensity rainfall; erosion occurrences, free board capacity, structural stability, etc. is recommended.

7.3 Remedial Measures

a. Operating and Maintenance Procedures

1. Clear brush, vines and trees on embankment slopes and near appurtenant structures.

2. Institute a program of annual technical inspection by a qualified registered engineer.

3. Develop a system for the recording of data with regard to items such as water levels, discharges, time and drawdown to assist those responsible for the monitoring of the structure.

4. Inspect and measure the sizes of low level outlets with the help of divers and/or by lowering the pond. Perform operational tests on the gates to assure that they are functional.

5. Develop and implement a formal warning system for the downstream impacted area.

6. Initiate a periodic maintenance program.

7.4 Alternatives

There are no alternatives to the recommendations discussed above.

APPENDIX A

INSPECTION CHECKLIST

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Somersville Pond Dam

DATE April 8, 1980

TIME 9:40 A.M.

WEATHER Cloudy

W.S.ELEV. 180.9 U.S. 165.74 D.S.

PARTY:

1. A. Reed, CEM
2. L. Topp, CEM
3. E. Dessert, CEM
4. R. Brown, CEM
5. R. Stetkar, GEI
6. G. Castro, GEI
7. S. Khanna, CEM
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

PERIODIC INSPECTION CHECKLIST

PROJECT Somersville Pond Dam DATE April 8, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT	
Crest Elevation	180.15
Current Pool Elevation	180.9
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Movement or Settlement of Crest	Very irregular crest, low area apparent near right abutment.
Lateral Movement	Too irregular to judge.
Vertical Alignment	Too irregular to judge.
Horizontal Alignment	Too irregular to judge.
Condition at Abutment and at Concrete Structures	Upstream wing wall of right intake structure partly collapsed.
Trespassing on Slopes	Extensive on crest, downstream and upstream slopes.
Sloughing or Erosion of Slopes or Abutments	Sloughing and erosion behind collapsed upstream stone wall left of spillway.
Rock Slope Protection - Riprap Failures	None
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	None observed. Earth embankment fully above reservoir level.
Piping or Boils	None observed.
Foundation Drainage Features	None known.
Toe Drains	None known.

PERIODIC INSPECTION CHECKLIST

PROJECT Somersville Pond Dam DATE April 8, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
DAM EMBANKMENT (Cont.)	
Instrumentation System	None known.
Vegetation	Some trees and brush growing on upstream slope up to 8 inches in diameter; grass covered crest.

PERIODIC INSPECTION CHECKLIST

PROJECT Somersville Pond Dam DATE April 8, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURES	
a. Approach Channel	No approach channels for right and left intake structures.
Drains or Weep Holes	None observed.
b. Intake Structure (Left)	Double wooden gated sluiceway.
Condition of Concrete	Some spalling.
Stop Logs and Slots	Deteriorated wooden gates - mechanical lifting equipment appears to be non-functional.
Intake Structure (Right)	Double wooden gated sluiceway.
Condition of Concrete	Good
Stop Logs and Slots	Wooden gates and manually operated lifting mechanism appear to be in good condition.

PERIODIC INSPECTION CHECKLIST

PROJECT Somersville Pond Dam DATE April 8, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS CONDUIT	
Left	Stone masonry arch culvert - inaccessible. Condition and other information unknown.
Right	Covered reinforced concrete canal - inaccessible. Condition and other information unknown.

PERIODIC INSPECTION CHECKLIST

PROJECT Somersville Pond Dam DATE April 8, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
Drain Holes	None observed.
Channel	Right outlet channel to powerhouse is covered canal, left is outlet into spillway channel.
Loose Rock or Trees Overhanging Channel	None
Condition of Discharge Channel	Not observable.

PERIODIC INSPECTION CHECKLIST

PROJECT Somersville Pond Dam DATE April 8, 1980

INSPECTOR _____ DISCIPLINE _____

INSPECTOR _____ DISCIPLINE _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	No approach channel, natural streambed.
General Condition	Not observable.
b. Weir and Training Walls	
General Condition of Concrete	Unobservable under water.
Rust or Staining	Unobservable under water.
Spalling	Substantial spalling at spillway abutments.
Any Visible Reinforcing	Right spillway abutment.
Any Seepage or Efflorescence	Along right abutment and downstream training wall.
Drain Holes	None observed.
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	Few large trees on both sides near abutments.
Floor of Channel	Bedrock
Other Obstructions	Mill building and double arch bridge may provide possible obstructions.
Other Comments	Right concrete training wall downstream of spillway shows severe spalling, seepage through wall and at base of wall; at one location, approximately 5 to 10 gpm.

APPENDIX B

ENGINEERING DATA

APPENDIX B-1

Correspondence pertaining to the history, maintenance, and modifications to the Somersville Pond Dam as well as copies of past inspection reports are located at:

State of Connecticut
Department of Environmental Protection
State Office Building
165 Capitol Avenue
Hartford, Connecticut
Attention: Mr. Victor J. Galgowski,
Dam Safety Engineer

APPENDIX B-2

SELECTED COPIES OF PAST INSPECTION REPORTS

LUCHS & BECKERMAN
CIVIL ENGINEERS • PLANNERS • LAND SURVEYORS

GLASTONBURY, CONN. 06033
12 NATIONAL DRIVE
PHONE 633-9401

PROVIDENCE, R. I. 02903
169 WEYBOSSET STREET
PHONE 421-0420

EAST LONGMEADOW, MASS. 01028
45 BAYMOR DRIVE
PHONE 525-6537

PARTNERS
JOHN LUCHS, JR.
STUART J. BECKERMAN

REPLY TO: Glastonbury

June 26, 1978

Victor F. Galgowski
Supt. of Dam Maintenance
Water & Related Resources
State of Connecticut
State Office Building
Hartford, Connecticut 06115

Re: Somersville Mill Pond - Somers
Our file No. 57-73-125

Dear Mr. Galgowski:

Per your letter of April 27, 1978, Mr. Robert McCabe and writer visited the dam site to observe present conditions. In my opinion, the inspection revealed no immediate danger of failure of the dam or the sluice (canal).

During periods of high run-off the ground north and easterly of the structure would be over-topped and act as an emergency spillway. The emergency spillway flow would enter the streambed westerly of the dam without causing any major problem. This emergency spillway area should be maintained in an open condition because the principal spillway is not capable of handling a 100 year flow.

Attached are three sheets of photographs taken at the time of our visit for the file and your reference. The inspection did show some maintenance is desirable and should be considered by the Owner as follows:

1. Make all sluice gates operable for emergency purposes.
2. Repair southerly abutment at building to prevent undermining of building.
3. Repair leaks in concrete sluice (canal) or northerly side of dam and in the abutment wall immediately south of concrete sluice.

For the record, during a conversation with Nickolas Dell Aquila of the Della Construction Co. of Warehouse Point, he stated his company had placed a large volume (mass) of concrete upstream of the dam to seal leaks through the stone face of dam.

If you have any questions, please call.

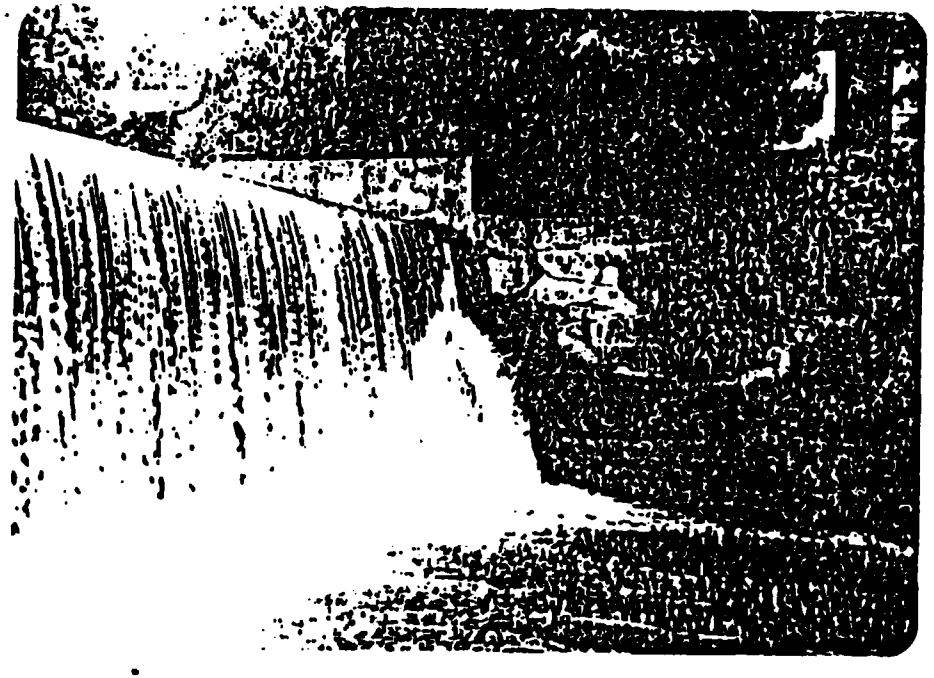
Very truly yours,

LUCHS & BECKERMAN, CIVIL ENGINEERS

John Luchs, Jr., P.E.
Senior Partner

JLjr/hb
Enclosures

Southerly abutment



Wall or abutment southerly of concrete sluice box on Northerly side of dam.

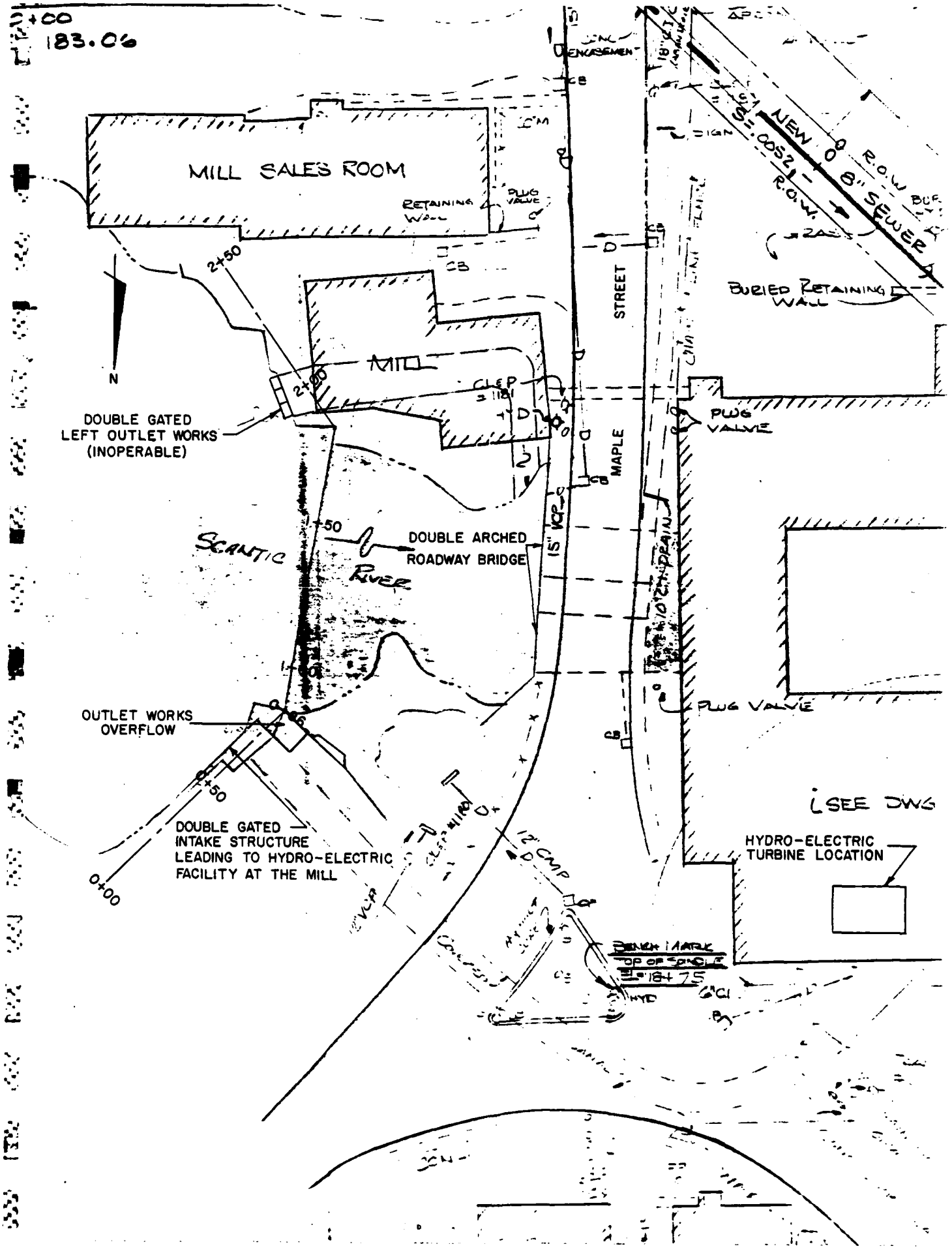
Leak at old [illegible] wall

X = present acting emergency spillway

Erosion at NE end of Maple Street bridge over S. Inlet River

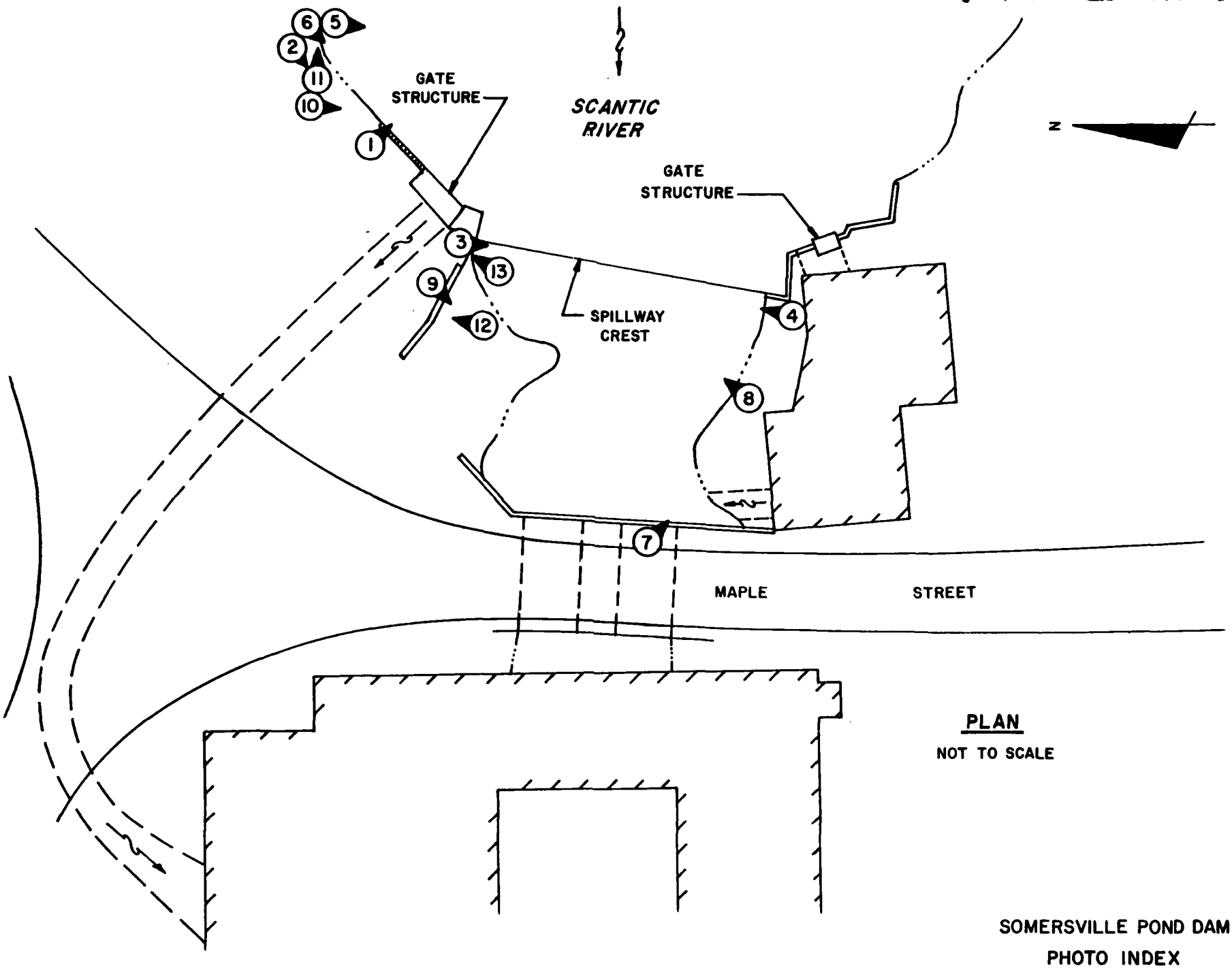
APPENDIX B-3

PLANS, SECTIONS AND DETAILS


3+00
183.06
MILL SALES ROOM
RETAINING WALL
PLUG VALVE
CB
2+50
2+00
MILL
N
DOUBLE GATED
LEFT OUTLET WORKS
(INOPERABLE)
1+50
SCANTIC
River
DOUBLE ARCHED
ROADWAY BRIDGE
1+00
OUTLET WORKS
OVERFLOW
0+50
DOUBLE GATED
INTAKE STRUCTURE
LEADING TO HYDRO-ELECTRIC
FACILITY AT THE MILL
0+00
STREET
MAPLE
15" RCP
12" CMP
NEW 8" SEWER
R.O.W.
BURIED RETAINING WALL
PLUG VALVE
PLUG VALVE
SEE DWG
HYDRO-ELECTRIC
TURBINE LOCATION
BENCH MARK
TOP OF SPINDLE
EL = 18+75
HYD
SIGN

APPENDIX C

PHOTOGRAPHS



PLAN

NOT TO SCALE

SOMERSVILLE POND DAM

PHOTO INDEX

PHOTO C-1 Overview of Somersville Pond from dam.

PHOTO C-2 Crest of dam from right dam abutment.

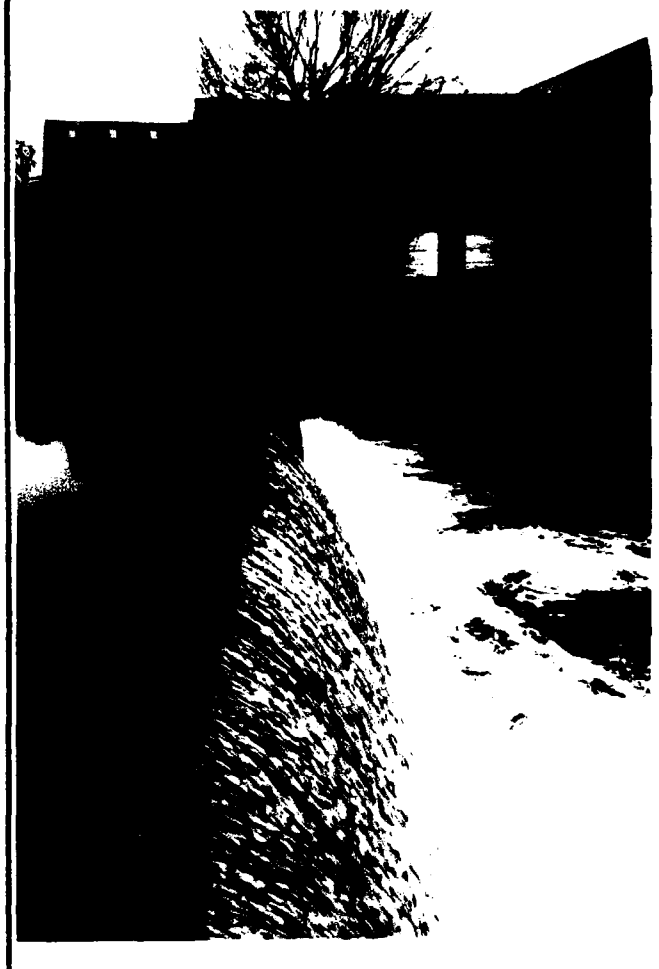


PHOTO C-3 Spillway crest from right spillway abutment.

PHOTO C-4 Spillway crest from left spillway abutment. Note outlet works sluiceway overflow at upper left corner of the photo.

PHOTO C-5 Gate controls and intake structure at left dam abutment.

PHOTO C-6 Gate controls at right spillway abutment.

PHOTO C-7 Left spillway abutment and right outlet works discharge tunnel(lower right of photo). Note cracked concrete wall, trees and brush growing in wall.

PHOTO C-8 Right spillway abutment. Note wet areas and heavily spalled concrete.

PHOTO C-9 Downstream channel from right spillway abutment.

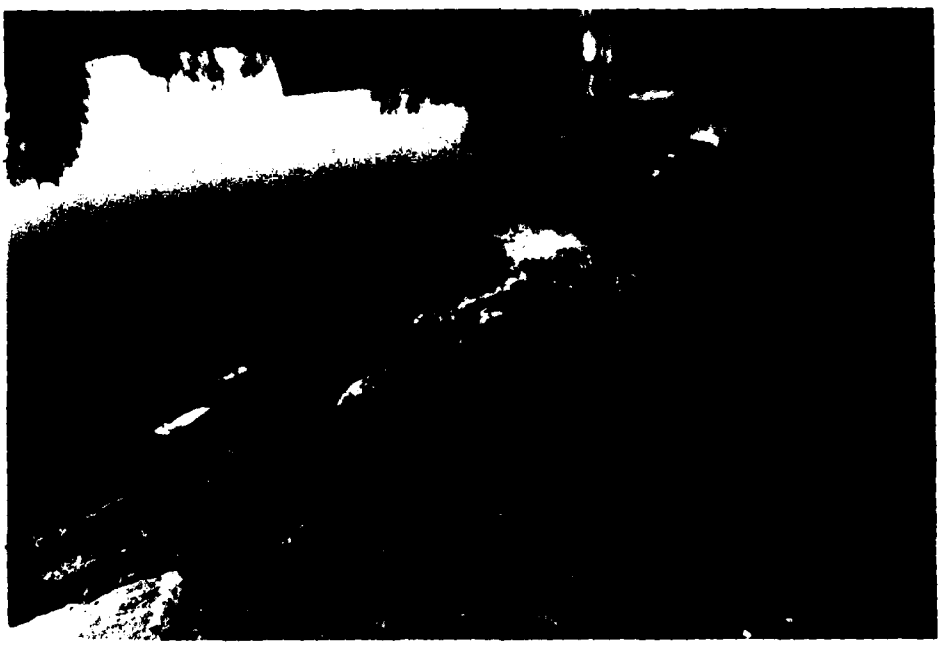


PHOTO C-10 Dislodged granite block wall along upstream slope at the right outlet works control gates structure.

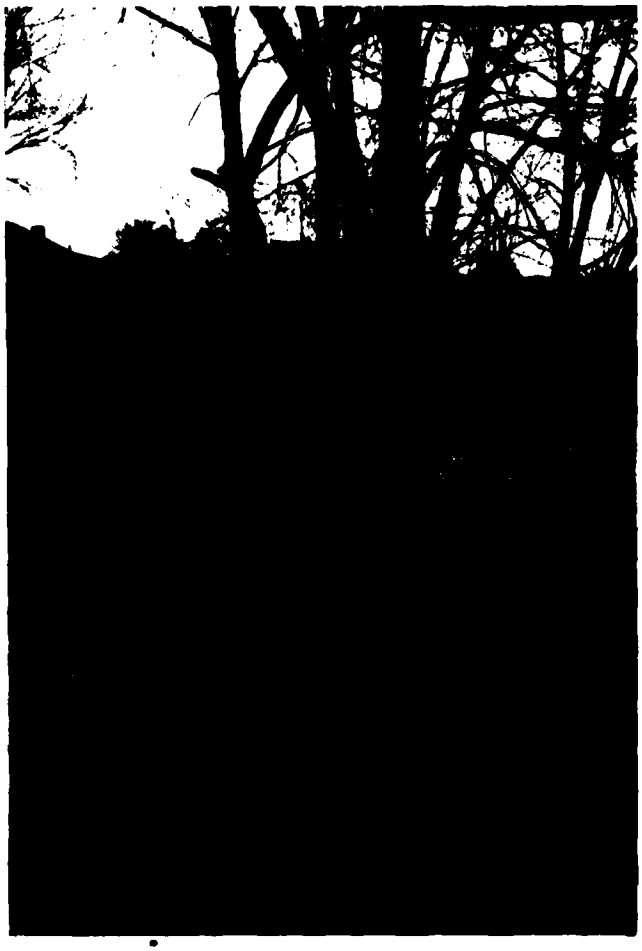


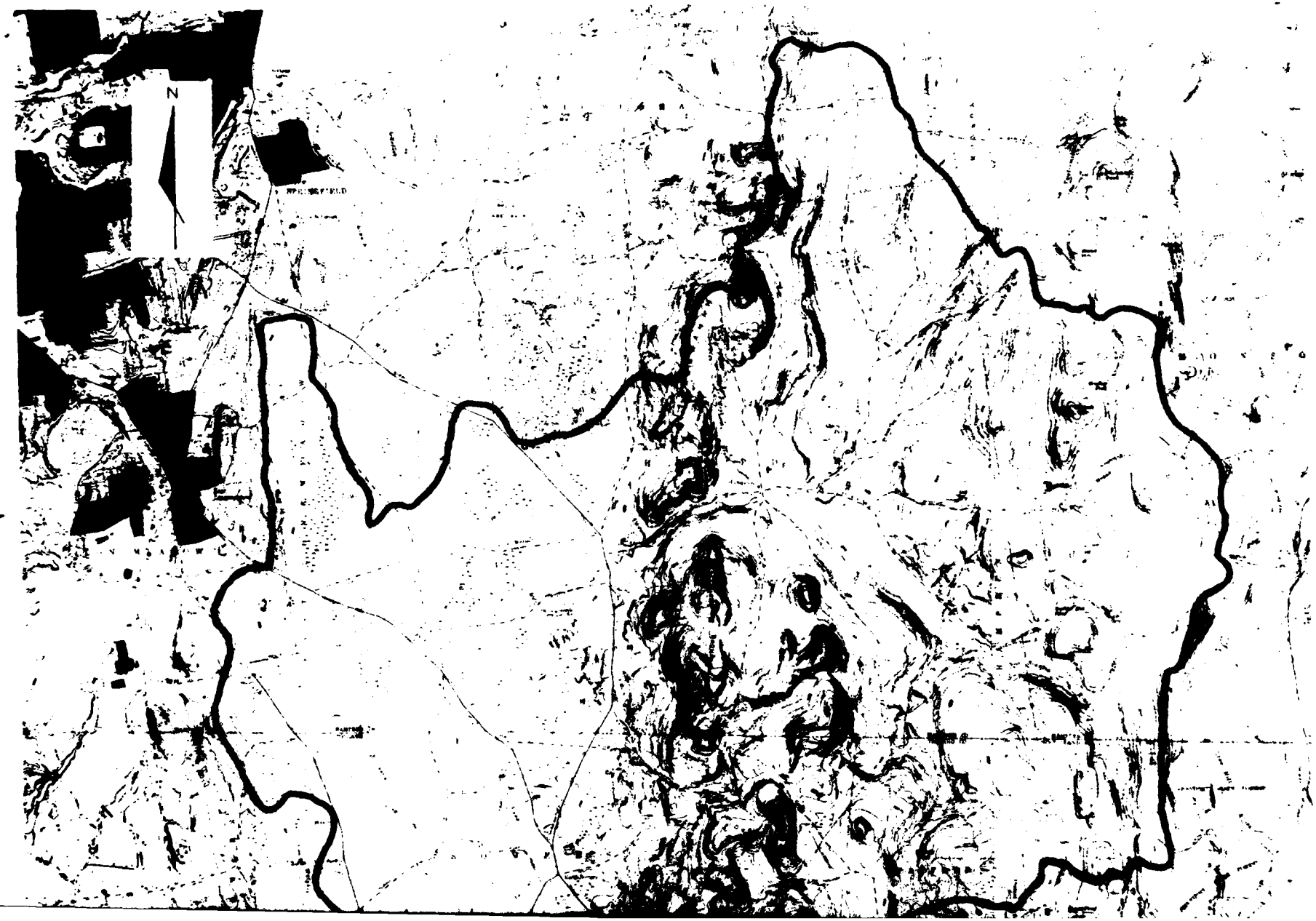
PHOTO C-11 Large diameter trees along upstream slope of right dam embankment.

PHOTO C-12 Seepage at right spillway abutment.

PHOTO C-13 Severely eroded right spillway abutment. Note exposed reinforcing.

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS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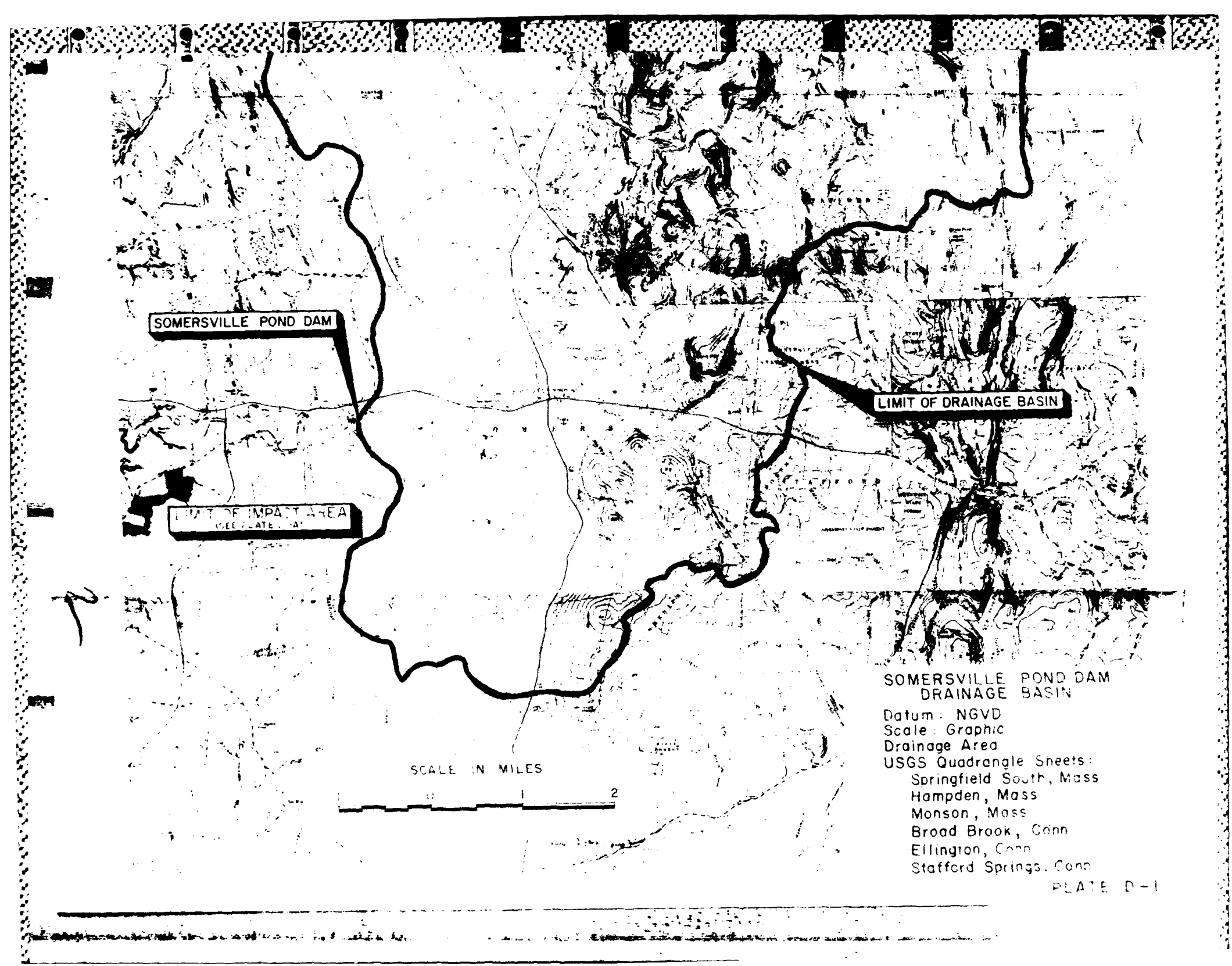


SOMERSVILLE POND DAM
DRAINAGE BASIN

Datum : NGVD
Scale : Graphic
Drainage Area
USGS Quadrangle Sheets:
Springfield South, Mass
Hampden, Mass
Monson, Mass
Broad Brook, Conn
Ellington, Conn
Stafford Springs, Conn

PLATE D-1

SOMERSVILLE POND DAM
DAM FAILURE IMPACT AREA

Datum: NGVD
U.S.G.S. Quadrangle Sheets:
Broad Brook, Connecticut
Ellington, Connecticut
Scale: 1:24,000

Plate D-1A

A. Size Classification — SOMERSVILLE POND DAM

Height of dam = 21.0 ft.; hence SMALL

Storage capacity at top of dam (elev. 184.5) = 553 AC-FT.; hence SMALL

Adopted size classification SMALL

B. Hazard Potential

The dam is classified as a SIGNIFICANT hazard potential structure because it's failure could result in the loss of a few lives and inundation of 3-4 dwellings, 1-2 industrial structures, and 1-2 roads (Scitico Road and Rt. 191). Utility services within the rights of way may temporarily be disrupted. It is estimated that the failure discharge will be 7250 C.F.S.

C. Adopted Classifications

HAZARD	SIZE	TEST FLOOD RANGE
SIGNIFICANT	SMALL	100 year to Half PMF

Adopted Test Flood = Half PMF = 200 CSM

= 11400 CFS

D. Overtopping Potential

Drainage Area = 57.0 sq. miles

Spillway crest elevation = 180.0 NGVD

Top of Dam Elevation = 184.5 NGVD

Maximum spillway discharge Capacity without overtopping of dam = 2750 CFS

"test flood" inflow discharge = 11400 CFS

"test flood" outflow discharge = 11200 CFS

% of "test flood" overflow carried by spillway without overtopping = 25%

"test flood" outflow discharge portion which overflows over the dam = 8450 CFS

% of test flood which overflows over the dam = 75%

Estimating Maximum Probable Discharges - Inflow and Outflow Values Date of Inspection: April 8, 1980

Name of Dam SOMERSVILLE POND DAM ; Location of Dam SCANTIC RIVER ; Town SOMERSVILLE, CT.

Watershed Characterization Flat; natural swamps and storages ; 5.7 sq. miles of drainage area is swampy or occupied by storage reservoirs

Adopted "test" flood = Half PMF = 200 CSM = 11400 CFS; Re = Effective Rainfall = 9.5 inches

D.A. = Drainage Area (Gross) = 57.0 Square Miles; Basin Slope = 0.004 hence; Flat

S.A. = Surface Area of Reservoir = 0.07 Square Miles; Time of Concentration Five hours

Shape and Type of Spillway = Free-overflow concrete spillway; stone masonry with concrete cap

B = Width of Spillway = 96.0 feet; C = Coefficient of Discharge = (3.09-Friction) = 3.00

Maximum Capacity of Spillway Without Overtopping = 2750 CFS = 25 % of test flood outflow

Top of Dam Elevation = 184.50 ; Spillway Crest Elevation = 180.0

Overflow portion of Length of Dam = 89 feet ; C = Coefficient of discharge for Dam = 3.0

Name of Dam	Test Flood Q_p		Inflow Characteristics		Outflow Characteristics First Approximation			Outflow Characteristics Second Approximation			Outflow Characteristics Third Approximation (Adopted)		
	CSM	CFS	h_0 in feet	S_0 in in.	Q_{p1} CFS	h_1 in ft.	S_1 in in.	S_2 in in.	h_2 in ft.	Q_{p2} CFS	S_3 in in.	h_3 in ft.	Q_{p3} CFS
1	2	3	4	5	6	7	8	9	10	11	12	13	14
Somersville Pond Dam	100 yr. = 70	3990	5.75	0.084	–	–	–	–	–	–	0.076	5.2	3600
	½ PMF = 200	11400	11.58	0.17	–	–	–	–	–	–	0.136	9.27	11200

Q_p = Discharge; h= Surcharge height; S = Storage in inches

NOTE: Outflow discharge values are computed as per COE guidelines.

NAME OF DAM: SOMERSVILLE POND DAM

ESTIMATING EFFECT OF SURCHARGE STORAGE ON "TEST FLOOD" *

A. This routing of floods through the reservoir was carried out according to the guidelines established by the Corps of Engineers in Phase 1 Inspection for Dam Safety Investigations issued in March, 1978.

B. Formulas used are as follows:

i. For no overtopping: $Q = C_1 B_1 h_1^{3/2}$
For overtopping: $Q = C_1 B_1 [h_2 + F.B.]^{3/2} + C_2 B_2 h_2^{3/2}$
For open channel flow: N/A
For orifice flow: N/A
where C_1 = coefficient of discharge for spillway; B_1 = length of spillway
C_2 = coefficient of discharge for dam; B_2 = Length of dam
h_1 = head over spillway crest - (feet); h_2 = head over top of dam
F.B. Free Board = (Top of Dam − Spillway Crest) = feet

ii. Surcharge storage in inches = $S = 12 (h_1 + h_2) \frac{S.A.}{D.A.} = 0.0147h$
where S.A. = surface area -
D.A. = drainage area in sq. miles

iii. $Q_{outflow} = Q_{inflow} (1 - \frac{S}{Re})$; where Re = Effective rainfall

iv. Length of dam = 89 feet ; Top of Dam elev. = 184.5 ; c for dam = 3.0
Length of spillway = 96 feet ; Spillway crest el. 180.0 ; c for spillway = 3.0

$Q = 3 \times 96 (4.5 + h_2)^{1.5} + 3 \times 89 (h_2)^{1.5}$ where h_2 is head over top of dam

S = Storage in inches = $12h \frac{S.A}{D.A} = 0.0147h$ where h is head over spillway crest

Q in CFS	Elevation	Total Head over crest $h_1 + h_2 = h$	Storage in inches = S	Remarks
11294	186	6.0	0.088	
11258	188	8.0	0.118	
11223	190	10.0	0.147	
11187	192	12.0	0.177	
11200	189.27	9.27	0.136	Adopted

* computations for routing of inflow discharge through a reservoir with water surface at spillway crest

"Rule of Thumb Guidance for Estimating Downstream Dam Failure Discharge"

BASIC DATA

Name of dam SOMERSVILLE POND DAM Name of town SOMERSVILLE, CT.

Drainage area = 57.0 sq. mi., Top of dam 184.5 NGVD

Spillway type = overflow-free concrete cap Crest of spillway 180.0 NGVD

Surface area at crest elevation = 0.07 sq. miles = 45 Acres

Reservoir bottom near dam = 163.0 NGVD

Assumed side slopes of embankments 2:1

Depth of reservoir at dam site 21.0 = y_o = 21.0 ft.

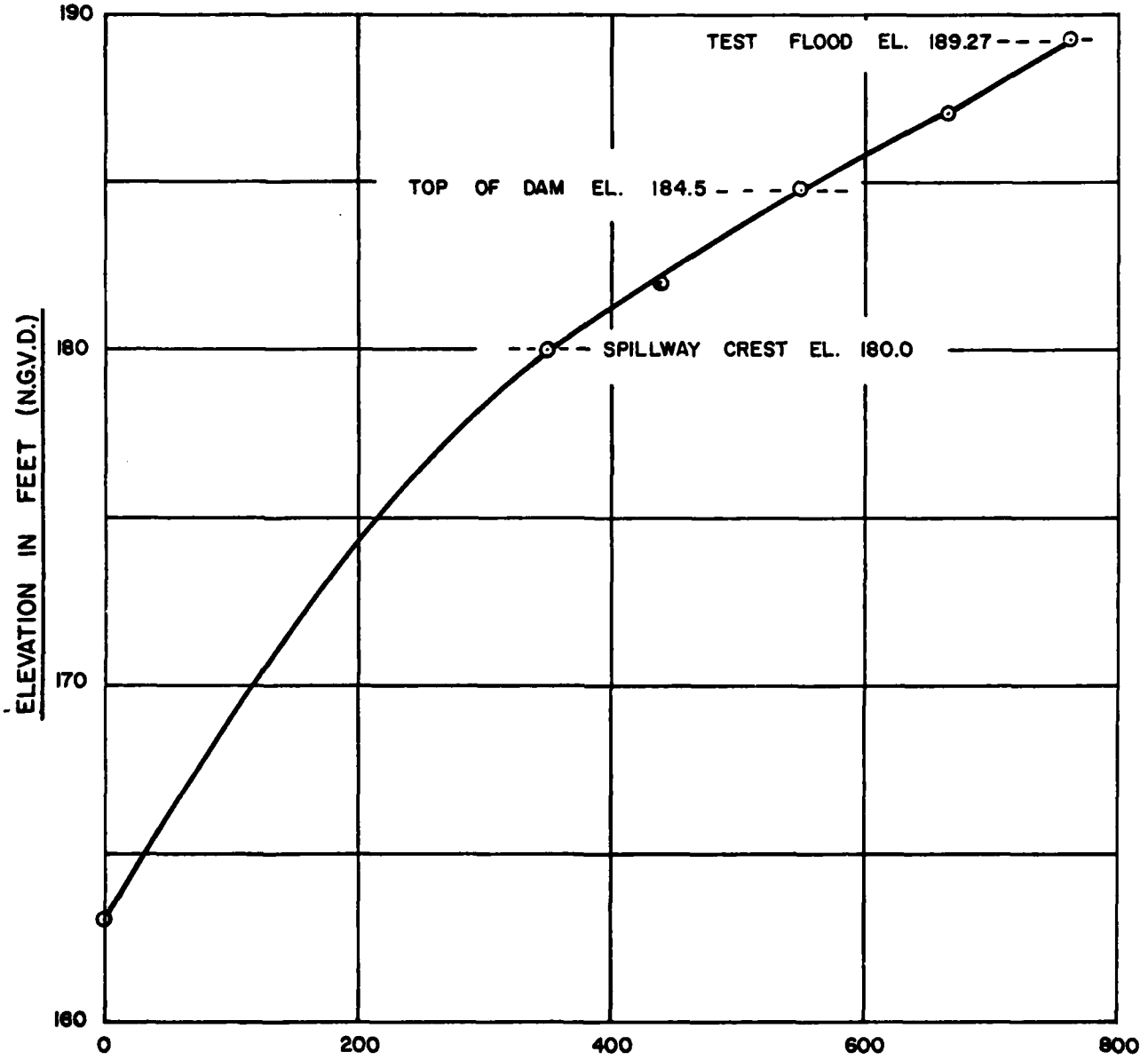
Mid-height elevation of dam = 174.0 NGVD

Length of dam at crest = 185 ft. (including spillway)

Length of dam at mid-height = 170 ft. (including spillway)

20% of dam length at mid-height = W_b = 34 ft.

Elevation (NGVD)	Estimated Storage in AC-FT
180.0	350 (Spillway Crest Elevation)
182.0	440
184.5	553 (Top of Dam Elevation)
187.0	865
189.27	755 (Test Flood Elevation)



STORAGE-ELEVATION CURVE

SOMERSVILLE POND DAM

PLATE D-6

SOMERSVILLE POND DAM

1. DAM FAILURE ANALYSIS

A. Failure Analysis

Discharge $= \frac{8}{27} W_B \sqrt{g}\, y_o^{1.5}$ C.F.S.

$= 1.68\, W_B\, y_o^{1.5}$

$= 5500$ C.F.S.

B. Maximum Spillway

Discharge with W.S.E.

At top of Dam @ 184.5 = 2750 C.F.S.

C. Total Dam Failure Discharge 5500 + 2750 = 7250 C.F.S.

D. Reservoir - Storage Data:

Volume of storage at spillway crest = 350 AC-ft. @ Elev. 180.0

Surcharge storage at top of dam = 203 AC-ft. @ Elev. 184.5

Storage Total = 553 AC-ft. @ Elev. 184.5

E. Flood Discharge Channel

1. Maximum depth of flow just D/S of Dam = $\frac{4}{9} y_o$ = 9.33 feet

Notes:

1. Failure of dam is assumed to be instantaneous. When pool reaches top of dam, and is a full-depth partial width rectangular shape failure with a width of failure = W = 34 feet and depth of failure y_o = 21.0 feet.
2. Steady, uniform flow phenomenon is assumed for determination of failure profile and is based on Manning's formulae.
3. Failure profile for impacted area determination is determined at three typical cross sections in the downstream channel. Reduction in discharge due to available storage has been taken into account.

ii. Reach 1

Length = 2000 feet; Station 0 to Station 20+00; n = 0.05 (Manning's value)

Bed slope = $S_o \simeq S_f = 0.0025$; Bed width = b = 110 feet

Bed width is scaled from U.S.G.S. map; scale 1" = 2,000 feet

As bed width is large and 1" = 2,000 feet and 10-foot contour interval scale maps are being used for various channel parameters, it is appropriate to assume that d = R = Hyd Radius = depth, hense Manning's formulae is transformed in this case to with channel parameters adopted as before.

$$Q = A \frac{1.49}{n} R^{2/3} \sqrt{S} = bd \frac{1.49}{n} d^{2/3} \sqrt{S}$$

$$Q = b \frac{1.49}{n} \sqrt{S}\, d^{5/3} = Kd^{5/3} = 161.8 d^{5/3}$$

State Discharge Relationship for Reach 1

Depth = d in Feet	Stage of Elevation	Discharge in CFS = Q	Velocity in ft./sec.	Storage Volume in AC-ft. = V
0	158.0	0	0	0
2	160.0	513	2.34	9.2
4	162.0	1629	3.70	20.2
6	164.0	3202	4.85	30.3
8	166.0	5170	5.88	40.4
10	168.0	7498	6.82	50.5
12	170.0	10160	7.70	60.6

F. Water surface profiles resulting from maximum spillway discharge and also from dam failure discharge are shown on Page D-15 for comparison purposes. This figure also shows the rise in water depth due to failure of dam.

Also, Discharge -- Depth and Storage-depth curves are shown on Page D-14 for downstream channel.

Notes: 1. Storage volume in AC-ft = $\frac{\text{(Length of Reach) (Bed Width) (Depth)}}{43{,}560}$

2. Failure discharge being large will mostly be overbank flow on existing channel.

G. For Q_1 = 7250 CFS; depth = 9.8 ft. V_1 = 49.5 AC-ft.
For Q = 2750 C.F.S. depth = 5.5 ft. V_1 = 28.0 AC-ft.
Trial $Q_2 = Q_1 \left(1 - \frac{V_1}{\text{Storage}}\right) = 7250\left(1 - \frac{49.5}{553}\right) = 6601$ CFS; d_2 = 9.3 ft.

For d_2 = 9.3 ft. $\therefore V_2$ = 46.9 AC-ft.

Avg V = $\frac{V_1 + V_2}{2}$ = 48.2 AC-ft.

$\therefore Q_2 = Q_1 \left(1 - \frac{V_{\text{Avg.}}}{\text{Storage}}\right) = 6618$ CFS; d_2 = 9.4 ft.
(48.2 / 553)

Depth at center of flood as adopted = $\frac{9.3 + 9.4}{2}$ = 9.35 ft.

iii. Reach 2

Length = 2000 feet; Station 20+00 to Station 40+00; n = 0.05 (manning's valve)

Bed slope = $S_o \simeq S_f$ = 0.0025; Bed width = b = 250 feet

Bed width is scaled from map of scale 1" = 2,000 feet

As bed width is large and 1" = 2,000 feet and 10-foot contour interval scale maps are being used for various channel parameters, it is appropriate to assume that d = R = Hyd Radius = depth, hense Manning's formulae is transformed in this case to with channel parameters adopted as before.

$Q = A \frac{1.49}{n} R^{2/3} S = bd \frac{1.49}{n} d^{2/3} S$

$Q = b \frac{1.49}{n} S d^{5/3} = Kd^{5/3} = 368 d^{5/3}$

Stage Discharge Relationship for Reach 2

Depth = d in Feet	Stage of Elevation	Discharge in CFS = Q	Velocity in ft/sec	Storage Volume in AC-ft = V
0	154	0	0	0
2	156	1168	2.33	23.0
4	158	3706	3.71	45.9
6	160	7282	4.85	68.9
8	162	N/A	N/A	N/A
10	164	N/A	N/A	N/A
12	166	N/A	N/A	N/A

G. For Q_2 = 6618 CFS; depth = 5.63 ft. V_2 = 64.6 AC-ft. = 65 AC-ft.

Trial $Q_3 = Q_2 \left(1 - \frac{V_2}{\text{Storage}}\right) = \left(1 - \frac{65}{553}\right) = 5840$ CFS; $d_3 = 5.19$ ft.

$\therefore V_3 = 59.6$ AC-ft. = 60 AC-ft.

Avg $V = \frac{V_1 + V_2}{2} = 62.5$ AC-ft.

$\therefore Q_3 = Q_2 \left(1 - \frac{V \text{ Avg.}}{\text{Storage}}\right) = 5870$ CFS; $y_3 = 5.2$ ft.

Depth at center of flood as adopted = $\frac{9.3 + 5.2}{2} = 7.25$ ft. Adopted = 7.0 ft.

iii. Reach 3

Length = 2000 feet; Station 40+00 to Station 60+00; n = 0.05 (Manning's)

Bed slope = S_o S_f = 0.0025; Bed width = b = 80 feet

Bed width is scaled from map of scale 1" = 2,000 feet

As bed width is large and 1" = 2,000 feet and 10-foot contour interval scale maps are being used for various channel parameters, it is appropriate to assume that d = R = Hyd Radius = depth, hense Manning's formulae is transformed in this case to with channel parameters adopted as before.

$$Q = A \frac{1.49}{n} = R^{2/3} \quad S = bd \frac{1.49}{n} d^{2/3} \quad S$$

$$Q = b \frac{1.49}{n} S \; d^{5/3} = Kd^{5/3} = 118 d^{5/3}$$

Stage Discharge Relationship for Reach 1

Depth = d in Feet	Stage of Elevation	Discharge in CFS = Q	Velocity in ft/sec	Storage Volume in AC-ft = V
0	150	0	0	0
2	152	374	2.34	7.33
4	154	1188	3.71	14.66
6	156	2335	4.86	22.00
8	158	3771	5.89	27.34
10	160	5468	6.83	34.68
12	162	8892	9.26	44.07

G. For Q_3 = 5870 CFS; depth = 10.23 ft. V_1 = 35.78 AC-ft. = 36.0 AC-ft.

Trial $Q_4 = Q_3 \left(1 - \frac{V_3}{\text{Storage}}\right)$ = $\left(1 - \frac{36}{553}\right)$ = 5488 CFS

$\therefore V_2$ = 35.0 AC-ft.

Avg V = $\frac{V_1 + V_2}{2}$ = 35.5 AC-ft.

$Q_4 = Q_3 \left(1 - \frac{\text{V Avg.}}{\text{Storage}}\right)$ = 5493 CFS; y_2 = 10.0 ft.

Depth at center of flood as adopted = $\frac{10 + 5.2}{2}$ = 7.75 ft.

Additional dam failure analysis beyond Reach 3 is not undertaken because the depth of flow of 7.75 feet at the end of Reach 3 will not cause any hazardous conditions further downstream except downstream flooding conditions. Moreover, failure discharge and depth will continually go on decreasing beyond Reach 3.

SUMMARIZED AND ADOPTED VALUES

FOR

DAM FAILURE ANALYSIS

i. Name of Dam SOMERSVILLE POND DAM

ii. Dam Failure Discharge _____ = 5500 cfs.

iii. Maximum Spillway Discharge _____ = 2750 cfs.

iv. Total Dam Failure Discharge _____ = 7250 cfs.

v. Normal (Manning Depth) for 7250C.F.S. = 9.8 feet

vi. Normal (Manning Depth) for 2750C.F.S. = 5.5 feet

vii. Increase in depth due to failure of dam = 3.3 feet

viii. W.S.E. prior to failure = Ground Elevation + 5.5

ix. W.S.E. after failure = Ground Elevation + 9.8

Note: The adopted depth of flow values are assumed to be accurate representations of damages in the impacted areas. Professional judgement is used in these final adopted values.

SOMERSVILLE POND DAM

COMPUTATIONS FOR SPILLWAY RATING CURVE AND OUTLET RATING CURVE COMPUTATIONS

Spillway width = 96.0 feet; Spillway crest elevation = 180 NGVD

Length of dam = 185 (including spillway) feet; Top of dam elevation = 184.5 NGVD

C = 3:0 for dam and spillway

i) SPILLWAY RATING CURVE COMPUTATIONS

Elevation (ft.) NGVD	Spillway Discharge (CFS)	Remarks
180.0	0	Spillway Crest Elevation
181.0	288	
182.0	815	
184.5	2750	Top of Dam Elevation
185.2	3600	100 year Flood Elevation
187.0	6390	
189.27	11200	Test Flood Elevation

ii) OUTLET RATING CURVE COMPUTATIONS
(Right side of sluice gated outlet) *

Elevation (ft.) NGVD	Discharge (CFS)	Remarks
172.0	0	Invert of Outlet Elevation
178.0	198	
180.0	280	Spillway Crest Elevation
182.0	343	
184.5	415	Top of Dam Elevation
187.0	464	
189.27	510	Test Flood Elevation

Estimated Size of outlet = 6.0ft. dia. pipe ; Area of outlet = 28.0 sq. ft.

Invert of outlet = 172.0 ; Center line of outlet = 175.0

* Left side outlet appeared plugged and inaccessible.

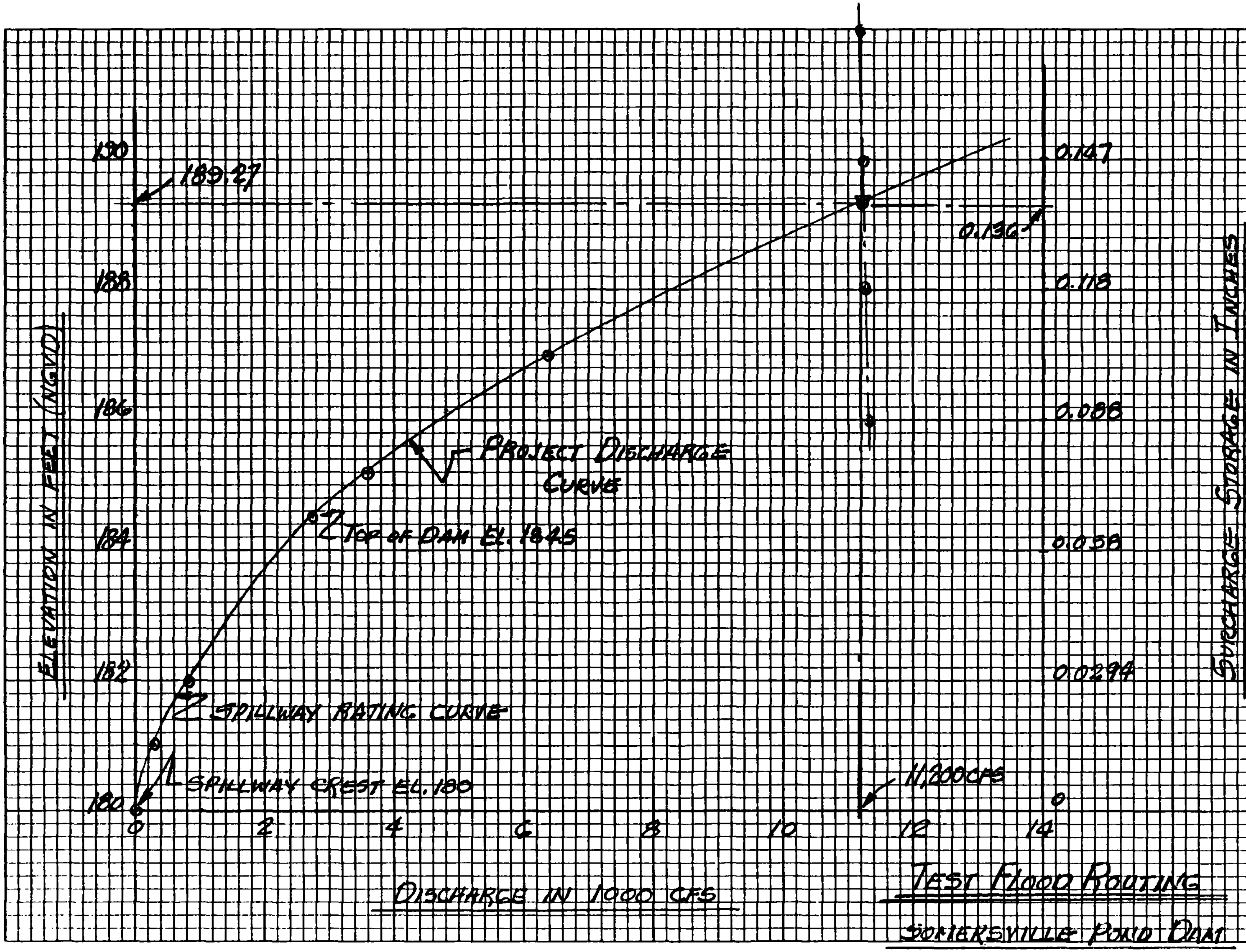

TEST FLOOD ROUTING
SOMERSVILLE POND DAM
ELEVATION IN FEET (NGVD)
SURCHARGE STORAGE IN INCHES
DISCHARGE IN 1000 CFS
180
182
184
186
188
190
0
2
4
6
8
10
12
14
0
0.0294
0.058
0.088
0.118
0.147
0.136
189.27
11,200 CFS
PROJECT DISCHARGE CURVE
TOP OF DAM EL. 1845
SPILLWAY RATING CURVE
SPILLWAY CREST EL. 180

PLATE D-14

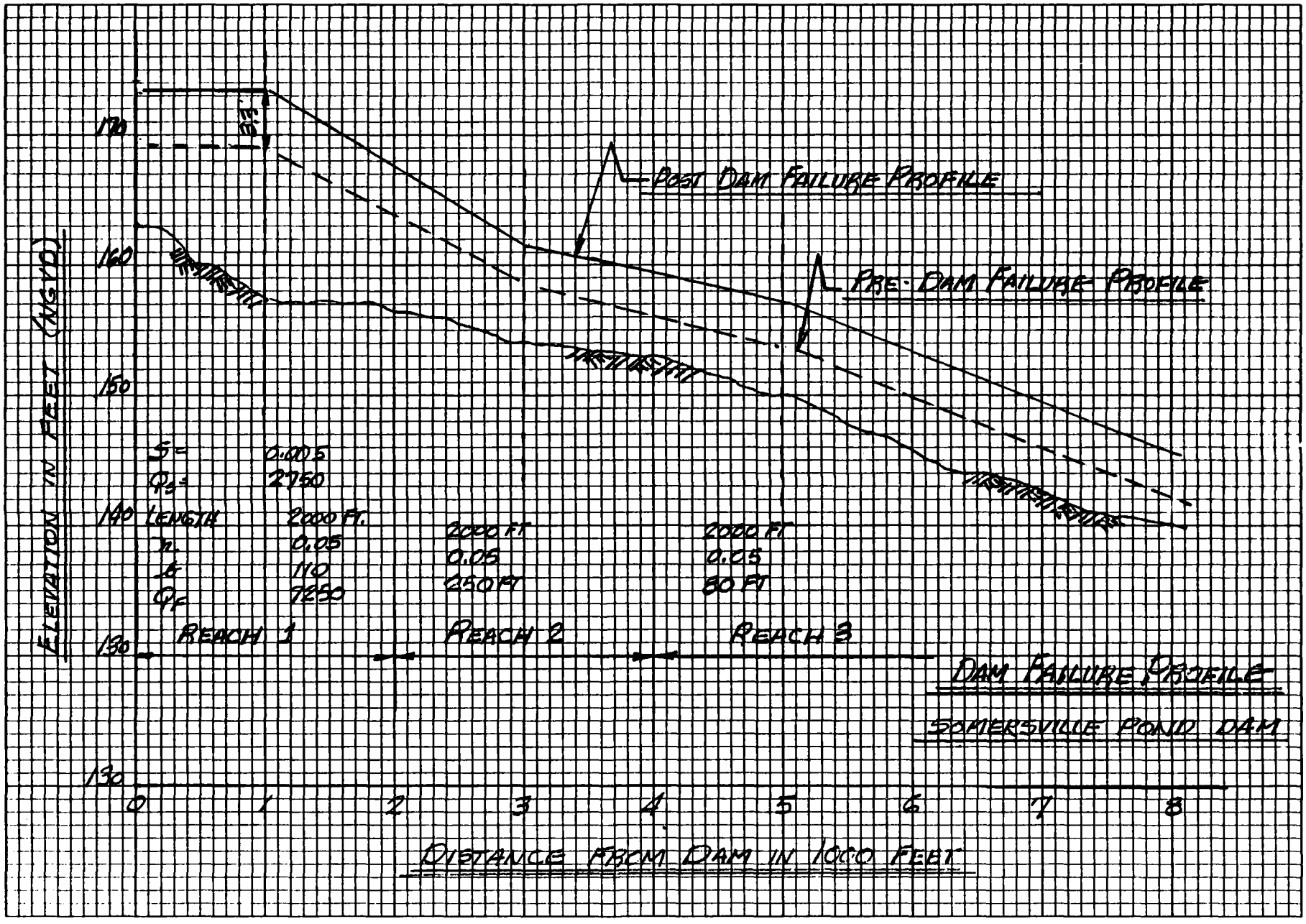

POST DAM FAILURE PROFILE
PRE-DAM FAILURE PROFILE
ELEVATION (MSL) IN FEET
170
160
150
140
130
S=
Qp=
LENGTH
n
b
Qc
0.005
2750
2000 FT.
0.05
110
7250
REACH 1
2000 FT
0.05
250 FT
REACH 2
2000 FT
0.05
80 FT
REACH 3
DAM FAILURE PROFILE
SOMERSVILLE POND DAM
0
1
2
3
4
5
6
7
8
DISTANCE FROM DAM IN 1000 FEET

PLATE D-15

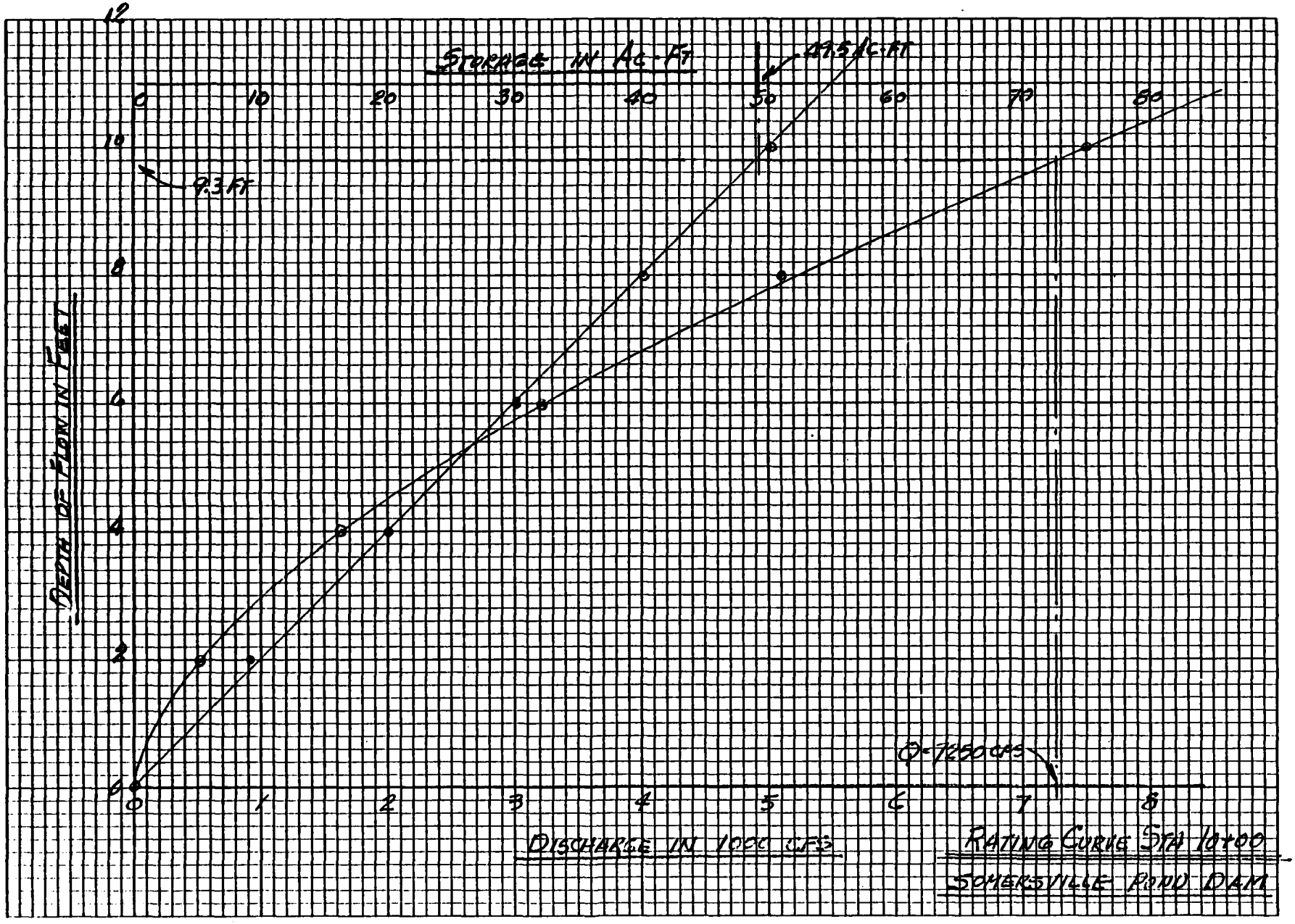
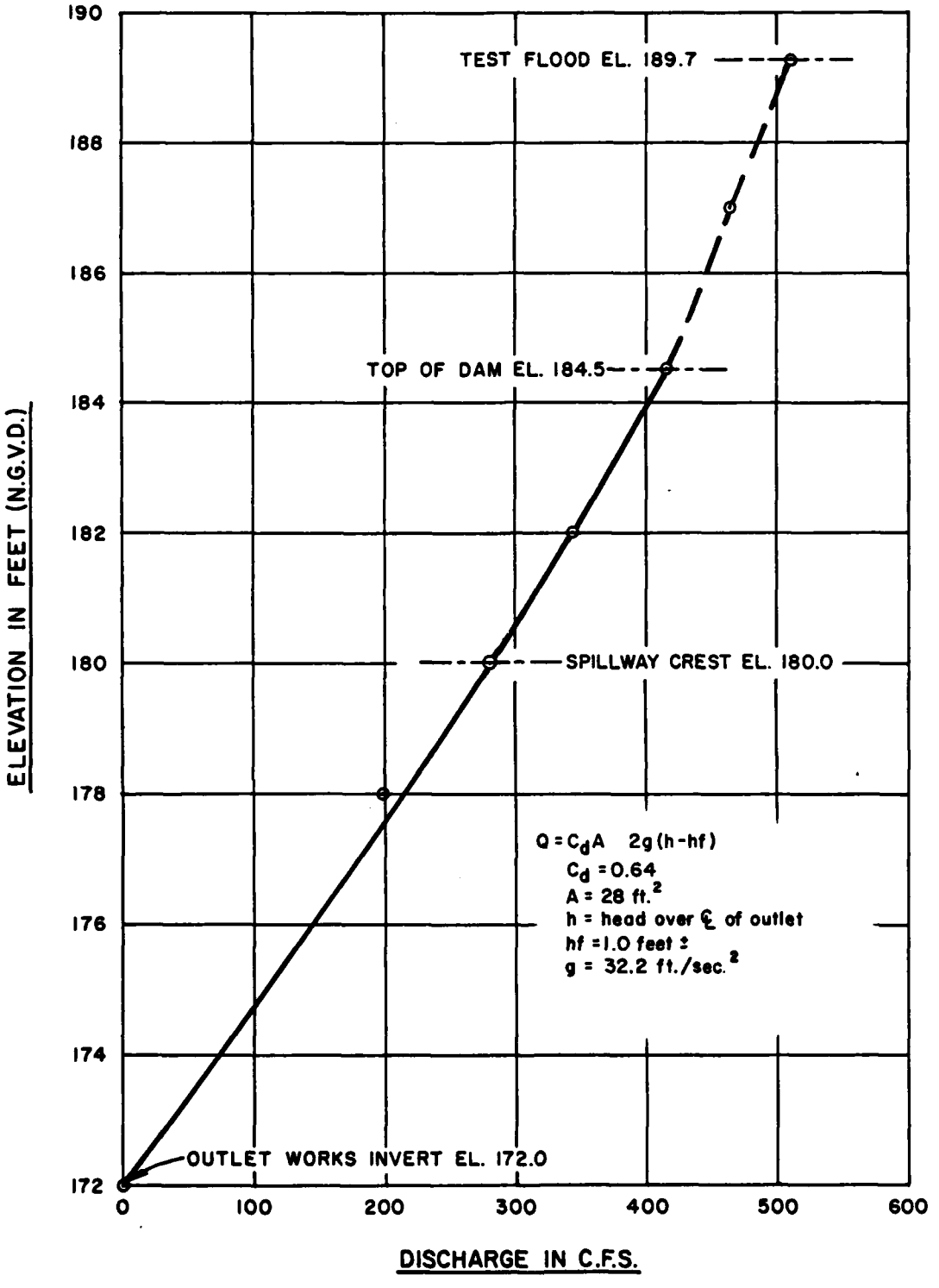

STORAGE IN AC-FT
0
10
20
30
40
50
60
70
80
12
10
8
6
4
2
0
9.3 FT
49.5 AC-FT
GAGE HEIGHT IN FEET
0
1
2
3
4
5
6
7
8
Q=7250 CFS
DISCHARGE IN 1000 CFS
RATING CURVE STA 10+00
SOMERSVILLE POND DAM

PLATE D-16



NOTE:

Exact size of gates is unknown. Computations for curve are based on size of inlet pipe to turbine located within the Gorbin Gentry mill complex.

OUTLET WORKS AT RIGHT ABUTMENT

OUTLET RATING CURVE

SOMERSVILLE POND DAM

PLATE D-17

APPENDIX E

INFORMATION AS CONTAINED IN THE
NATIONAL INVENTORY OF DAMS

STATE	IDENTITY NUMBER	DIVISION	STATE	COUNTY	CONGR DIST.	STATE	COUNTY	CONGR DIST.	NAME	LATITUDE (NORTH)	LONGITUDE (WEST)	REPORT DATE DAY	MO	YR
CT	273	NED	CT	013	02				SOMERSVILLE POND DAM	415M.0	7226.7	01	JUL	80

POPULAR NAME	NAME OF IMPOUNDMENT
	SOMERSVILLE POND

REGION	BASIN	RIVER OR STREAM	NEAREST DOWNSTREAM CITY–TOWN–VILLAGE	DIST FROM DAM (MI.)	POPULATION
01	10	SCANTIC RIVER	SOMERSVILLE	1	2000

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCTURAL HEIGHT (FT.)	HYDRAULIC HEIGHT (FT.)	IMPOUNDING CAPACITIES MAXIMUM (ACRE–FT.)	IMPOUNDING CAPACITIES NORMAL (ACRE–FT.)	DIST	OWN	FED R	PRV/FED	SCS A	VER/DATE
REPG	1890	RM	21	17	552	350	NED	N	N	N	N	

REMARKS

O/S HAS	SPILLWAY CREST LENGTH	SPILLWAY TYPE	SPILLWAY WIDTH (FT.)	MAXIMUM DISCHARGE (FT.)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (MW)	POWER CAPACITY PROPOSED (MW)	NAVIGATION LOCKS NO.	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)	LENGTH (FT.)	WIDTH (FT.)
2	185	U	96	2750												

OWNER	ENGINEERING BY	CONSTRUCTION BY
STATE OF CONNECTICUT	UNKNOWN	UNKNOWN

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE DAY	MO	YR	AUTHORITY FOR INSPECTION
CE MAGUIRE INC	04	APR	80	PL 92-367

REMARKS

END

FILMED